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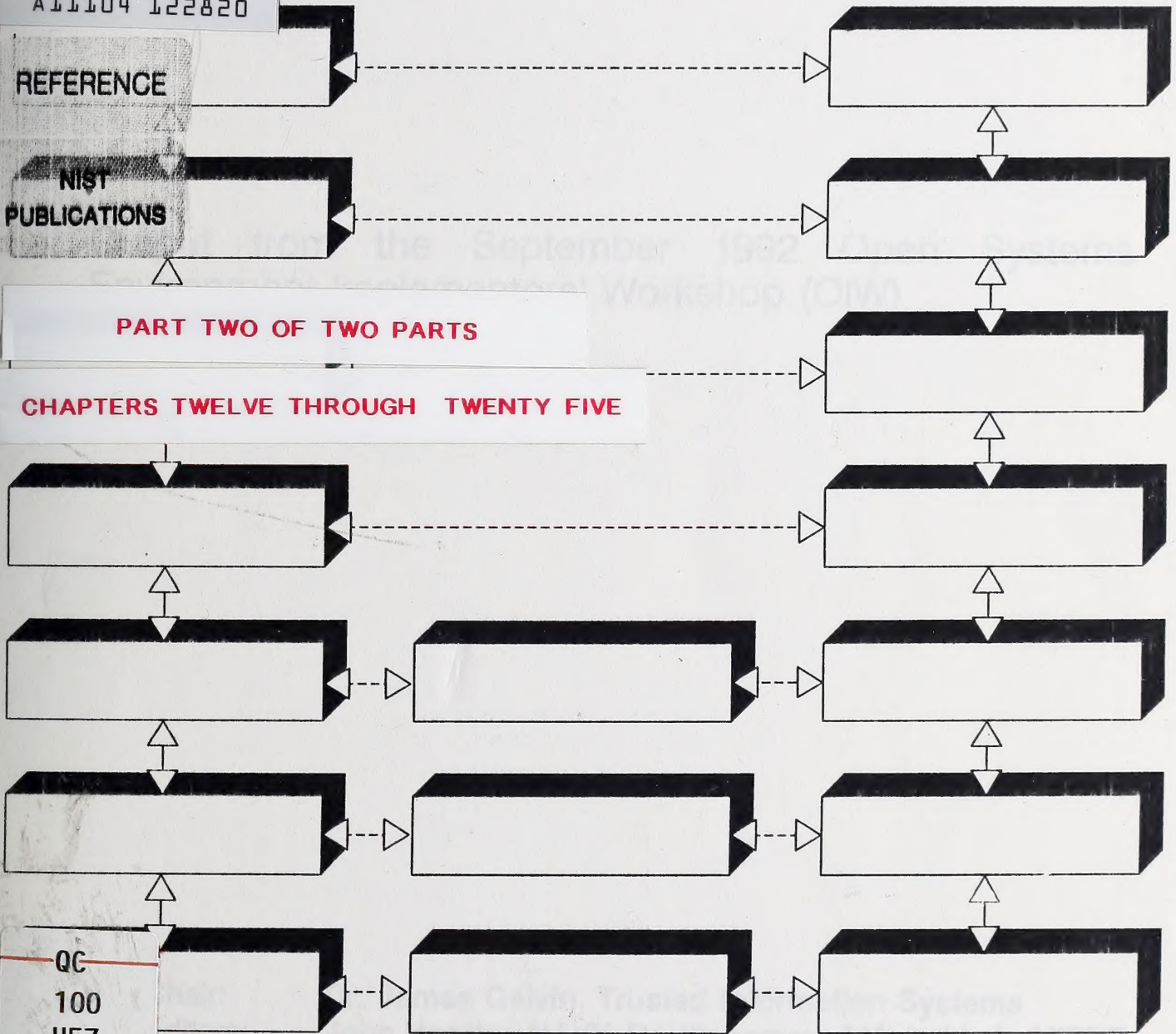
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PART TWO OF TWO PARTS

CHAPTERS TWELVE THROUGH TWENTY FIVE



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Stable Implementation Agreements for Open Systems Interconnection Protocols: Part 12 - OS Security

Output from the September 1992 Open Systems
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SIG Chair:
SIG Editors:

Dr. James Galvin, Trusted Information Systems
John Hooder, NAVY, Dr. Mohammad Mirhakkak, MITRE

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Foreword

This part of the Stable Implementation Agreements was prepared by the Security Special Interest Group (SECSIG) of the Open Systems Environment Implementors' Workshop (OIW) hosted by the National Institute of Standards and Technology (NIST). See Procedures Manual for Workshop charter.

Text in this part has been approved by the Plenary of the above-mentioned Workshop. This part replaces the previously existing chapter on this subject. There is significant technical change from this text as previously given.

Future changes and additions to this version of these Implementor Agreements will be published as change pages. Deleted and replaced text will be shown as strikeout. New and replacement text will be shown as shaded.

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Part 12 - Security

Editor's Note - Previous material in this part has been deleted and is no longer applicable.

0 Introduction

The relationship between protocols and security is accomplished by developing a security profile that binds these two together. Security profiles define protocol specific implementations of security architectures.

A security profile includes the following items:

- a) A grouping of the security services to be offered;
- b) The placement of those security services;
- c) The selection of mechanisms to support the placed security services.

This part completes this sequence of steps for several generalized security architectures. A generalized security architecture is chosen and tailored to derive a protocol-specific security profile. This part is comprised of protocol-specific security profiles and other supporting functions.

1 Scope

2 Normative References

[ISO7498-2] ISO/IEC 7498-2 *Information Processing Systems - Open Systems Interconnection - Basic Reference Model - Part 2: Security Architecture*, February 1989.

[ISO8649] ISO/IEC 8649: 1988/DADAmd 1: 1990 *Service Definition for the Association Control Service Element, Addendum Amendment 1: Peer-Entity Authentication During Association Establishment*.

[ISO8650] ISO/IEC 9594-3 *Information Technology - Open Systems Interconnection - The Directory - Part 3: Abstract Service Definition*.

[ISO8650/1] ISO/IEC 8650: 1988/DADAmd 1: 1990 *Protocol Specification for the Association Control Service Element, Amendment 1: Peer-Entity Authentication During Association Establishment*.

[ISO9594-7] ISO/IEC 9594-7 *Information Processing Systems - Open Systems Interconnection - The Directory - Part 7: Selected Object Classes*, 1990.

[ISO9594-8] ISO/IEC 9594-8 *Information Processing Systems - Open Systems Interconnection - The Directory - Part 8: Authentication Framework*, 1990.

[ISO10021-4] ISO/IEC 10021-4 *Information Processing Systems - Text Communication - MOTIS -*

Message Transfer System : Abstract Service Definition and Procedures.

- [X.509-88] CCITT X.509:1988 *The Directory - Authentication Framework.*
- [X.511-88] CCITT X.511:1988 *The Directory - Abstract Service Definition.*
- [X.411-84] CCITT X.411:1984 *Message Transfer System - Message Transfer Layer.*
- [X.521-88] CCITT X.521:1988 *The Directory - Selected Object Classes.*

3 Definitions

4 Symbols and Abbreviations

5 Architectures

Editor's Note - The proposed text for this clause appears in WIA Part 12, clause 5.

5.1 Introduction

5.2 General OIW Application Environments

5.3 Security Classes

5.4 Guidelines for OIW Application Profile Development

6 Key Management

[ISO7498-2] defines Key Management (KM) as the "generation, storage, distribution, deletion, archiving, and application of keys in accordance with a security policy." The Security SIG recognizes that security policies are outside the scope of IAs, and it is inappropriate to make general recommendations in the absence of a KM framework.

7 Security Algorithms

Editor's Note - Implementors are cautioned that security of an algorithm may change at any time. Therefore, the WIA must be consulted in order to determine if there is more current information.

The algorithms included here are listed in no particular order. It is beyond the scope of these agreements to recommend the use of one algorithm over another. However, if a vulnerability is known to exist a reference will be provided along with a recommendation not to use the algorithm.

This clause references a definitive specification for each algorithm, which includes an object identifier. In general, control of the definitive specification is expected to be outside the scope of the OIW. The benefit of not controlling the specification is that the organization that developed the algorithm is best situated to maintain and have knowledge of the security of the algorithm. Algorithms for which there is no controlling organization are defined in an Annex in this Part.

For each algorithm, its typical usage is stated, its definitive reference is given, and its object identifier is included for reference purposes. Optionally, additional information may be included, for example a reference to known vulnerabilities.

Editor's Note - Some of the references are RFCs, Internet Drafts, and PKCS documents. We need to include information on how to access these documents.

7.1 Square-Mod-N

Square-Mod-N is a hash algorithm that is used to compute a fixed size representation of an input stream. It is defined in [X.509] and its object identifier is defined there as:

```
sqMod-n ALGORITHM  
PARAMETER BlockSize  
::= {hashAlgorithm 1}
```

```
BlockSize ::= INTEGER
```

Recent research regarding the square-mod-n one-way hash function described in Annex D of [X.509] has revealed that the function is not secure. Its use, therefore, is discouraged.

Editor's Note - We need the reference that identifies its vulnerabilities so we can recommend it not be used.

7.2 Message Digests

These message digest algorithms (or hash algorithms) compute a fixed size representation of an input stream. They have different performance characteristics and employ different computational techniques, making each suitable for different applications.

7.2.1 MD2

MD2 is a message digest algorithm that employs accepted, traditional computational techniques. Its speed is the slowest of the message digests listed here.

It is defined in Internet Draft [a] and its object identifier is defined there as:

```
md2 ALGORITHM
PARAMETER NULL
::= {iso(1) member-body(2) US(840) rsadsi(113549) digestAlgorithm(2) 2}
```

Editor's Note - There is a Directory SIG OID for this algorithm.

The reference includes a source code implementation of the algorithm written in the C programming language. MD2 is copyrighted and its use may require specific permission or a license. Details are stated in the Internet Draft.

7.2.2 MD4

MD4 is a message digest algorithm that employs non-traditional computational techniques to enhance its speed in software and hardware with native 32-bit arithmetic. Its speed is the fastest of the message digests listed here.

It is defined in Internet Draft [b] and its object identifier is there as:

```
md4 ALGORITHM
PARAMETER NULL
::= {iso(1) member-body(2) US(840) rsadsi(113549) digestAlgorithm(2) 4}
```

This reference includes a source code implementation of the algorithm written in the C programming language.

It is suggested that MD4 be used only with applications for which performance is critical.

Editor's Note - We need to include text from the MD4/5 Internet Drafts which describes the differences between the two algorithms and the preference for MD5.

7.2.3 MD5

MD5 is a message digest algorithm that employs traditional computational techniques with the speed enhancements of MD4.

It is defined in Internet Draft [c] and its object identifier is defined there as:

```
md5 ALGORITHM
PARAMETER NULL
::= {iso(1) member-body(2) US(840) rsadsi(113549) digestAlgorithm(2) 5}
```

This reference includes a source code implementation of the algorithm written in the C programming language.

7.3 RSA

RSA is a public key (asymmetric) cryptographic algorithm, typically used in conjunction with message digest (or hash) algorithms to create digital signatures and for confidential distribution of symmetric keys. It may also be used to exchange confidential messages.

The RSA algorithm is defined in [d] and is also described in Annex C of [X.509]. The RSA technology is patented in the United States [e][f].

Editor's Note - Explain why there are two definitions.

7.3.1 RSA Definition

RSA is defined in [X.509] and its object identifier is defined there as:

```
rsa ALGORITHM
PARAMETER KeySize
::= {encryptionAlgorithm 1}
```

```
KeySize ::= INTEGER
```

The key size specifies the length in bits of the RSA public key modulus.

7.3.2 RSA Encryption

RSA Encryption is defined in PKCS #1 [g] and its object identifier is defined there as:


```
rsaEncryption ALGORITHM
PARAMETER NULL
::= {iso(1) member-body(2) US(840) rsadsi(113549) pkcs(1) pkcs-1(1) 1}
```

7.4 Square-Mod-N with RSA

Square-Mod-N is a signature algorithm that combines the Square-Mod-N hash algorithm with the RSA cryptographic algorithm to produce a digital signature. This algorithm is defined in [X.509] and its object identifier is defined there as:

```
sqMod-nWithRSA ALGORITHM
PARAMETER KeyAndBlockSize
::= {signatureAlgorithm 1}

KeyAndBlockSize ::= INTEGER
```

Recent research regarding the square-mod-n one-way hash function described in Annex D of [X.509] has revealed that the function is not secure. Its use, therefore, is discouraged.

7.5 Message Digests with RSA

The algorithms listed below are signature algorithms that combine a message digest algorithm with the RSA cryptographic algorithm to produce a digital signature.

Editor's Note - The OIDs below have been assigned by the Directory SIG and the Security SIG. Should we explain why they do not appear in a single tree?

7.5.1 MD2 with RSA

Its object identifier is:

```
md2WithRsa ALGORITHM
PARAMETER NULL
::= {signatureAlgorithm 1}
```

Editor's Note - This OID was assigned by the Directory SIG.

7.5.2 MD4 with RSA

Its object identifier is:

```
md4WithRSA ALGORITHM
PARAMETER NULL
::= {algorithm 2}
```

7.5.3 MD5 with RSA

Its object identifier is:

```
md5WithRSA ALGORITHM  
PARAMETER NULL  
::= {algorithm 3}
```

7.6 Message Digests with RSA Encryption

The algorithms listed below are signature algorithms that combine a message digest algorithm with the RSA Encryption cryptographic algorithm to produce a digital signature.

7.6.1 MD2 with RSA Encryption

MD2 with RSA encryption is defined in PKCS #1 [g] and its object identifier is defined there as:

```
md2WithRSAEncryption ALGORITHM  
PARAMETER NULL  
::= {iso(1) member-body(2) US(840) rsadsi(113549) pkcs(1) pkcs-1(1) 2}
```

7.6.2 MD4 with RSA Encryption

Its object identifier is:

```
md4WithRSAEncryption ALGORITHM  
PARAMETER NULL  
::= {algorithm 4}
```

7.6.3 MD5 with RSA Encryption

MD5 with RSA Encryption is defined in PKCS #1 [g] and its object identifier is defined there as:

```
md5WithRSAEncryption ALGORITHM  
PARAMETER NULL  
::= {iso(1) member-body(2) US(840) rsadsi(113549) pkcs(1) pkcs-1(1) 4}
```

7.7 Diffie-Hellman Key Exchange

Diffie-Hellman Key Exchange is a public key (asymmetric) algorithm whereby two parties, without any prior arrangements, can agree upon a secret key. This key could be used, for example, to encrypt further communications between the parties.

The Diffie-Hellman Key Exchange is defined in [h] and is also described in [j]. The Diffie-Hellman Key Exchange is patented in the United States [i][f].

The object identifier is defined in PKCS #3 [j] as:

```
dhKeyAgreement ALGORITHM
PARAMETER DHParameter
::= {iso(1) member-body(2) US(840) rsadsi(113549) pkcs(1) pkcs-3(3) 1}

DHParameter ::= SEQUENCE {
  prime INTEGER, -- p
  base INTEGER -- g
}
```

7.8 El Gamal

ElGamal is a public key (asymmetric) digital signature algorithm. It is defined in [k]. Its object identifier is:

```
ElGamal ALGORITHM
PARAMETER NULL
::= {encryptionAlgorithm 1}
```

Editor's Note - This OID was assigned by the Directory SIG.

In [X.509], the ASN.1 data element subjectPublicKey defined as BIT STRING should be interpreted in the case of ElGamal as being of type:

```
SEQUENCE {
  prime INTEGER, -- p
  base INTEGER, -- alpha
  key INTEGER -- public key, Y
}
```

Also, in [X.509], the value associated with the ENCRYPTED MACRO should be interpreted in the case of ElGamal as being of type:

```
SEQUENCE {
  s INTEGER,
  r INTEGER
}
```

The ElGamal technology is patented in the United States [f].

Editor's Note - Should we describe and define OIDs for the message digest with ElGamal signature algorithms? There is a Directory SIG OID for md2WithElGamal.

7.9 Data Encryption Standard

The Data Encryption Standard (DES) is a secret key (symmetric) cryptographic algorithm. It is defined in FIPS 46-1 [l]. It is also defined as DEA-1 in ANSI X3.92-1981 [m].

Implementors will also find several other references useful. FIPS PUB 74 [p] provides guidance on the implementation and use of DES and includes a complete specification of the algorithm. SPEC PUB 500-20 [p] describes the design and operation of the NIST (formerly NBS) testbed that is used for the validation of DES implementations. It specifies a set of 291 test cases that have been designed to exercise every basic element of the algorithm, and as a further check on the correctness of an implementation, it specifies an extensive Monte Carlo analysis. SPEC PUB 500-61 describes the design of four maintenance tests for DES implementations. The tests consist of an iterative test procedure that uses a small program and minimum data. The tests are designed to be independent of implementation and to be fast enough to test devices during actual operation. The tests are defined as four specific stopping points in a general testing process and satisfy four testing requirements of increasing degree of completeness on the thoroughness of testing desired.

There are four modes of operation of the DES, as specified by FIPS 81 [n] and ANSI X3.106-1983 [o]. The modes specify how the data will be encrypted and decrypted.

7.9.1 DES-ECB

This is the Electronic Codebook mode of operation. Its object identifier is:

```
desECB ALGORITHM  
PARAMETER CBCParameter  
::= {algorithm 6}
```

7.9.2 DES-CBC

This is the Cipher Block Chaining mode of operation. Its object identifier is:

```
desCBC ALGORITHM  
PARAMETER CBCParameter  
::= {algorithm 7}
```

The PARAMETER is needed to specify the Initialization Vector, which need not be kept secret.

7.9.3 DES-OFB

This is the Output Feedback mode of operation. Its object identifier and parameters are:

```
desOFB ALGORITHM  
PARAMETER FBParameter  
::= {algorithm 8}
```

The parameters are needed to specify an IV and the number of feedback bits.

7.9.4 DES-CFB

This is the Cipher Feedback mode of operation. Its object identifier and parameters are

```
desCFB ALGORITHM  
PARAMETER FBParameter  
::= {algorithm 9}
```

The parameters are needed to specify an IV and the number of feedback bits.

7.10 DES-MAC

DES-MAC is a Message Authentication Code algorithm (cryptographic checksum) based on the DES.

It is specified in FIPS 113 [s] and is equivalent to the binary mode defined in ANSI X9.9-1986 [t]. Its object identifier and parameter are:

```
desMAC ALGORITHM  
PARAMETER MACParameter  
::= {algorithm 10}
```

The parameter is needed to specify the MAC length in bits.

DES-MAC is equivalent to DES-CBC using an all zero Initialization Vector (IV), with all but the last cipher output block discarded. Separate keys (where one may simply be a variant of the other) should be used if both DES-CBC encrypting and MACing the same data.

Editor's Note - We need to include the reference which specifies the vulnerability when the same key is used to DES-CBC encrypt and MAC the same data, and recommends the use of separate keys.

7.11 ASN.1

7.11.1 Distinguished Encoding Rules

In order to allow verification of digital signatures produced by the SIGNED and SIGNATURE MACROs of [ISO9594-8], it is necessary to define a set of distinguished encoding rules to produce an unambiguous encoding of a given abstract syntax value. [ISO9594-8] defines a number of such encoding rules (8.7), but is, unfortunately, underspecified in the following areas:

- a) Ordering of SET OF components;
- b) Handling of unused trailing zero bits;
- c) Invocation and designation of new character sets in some of the character string types.

The following rules remove these ambiguities:

- a) The [ISO9594-8] distinguished encoding rules are always used;
- b) For SET OF types, components are sorted into ascending order of the distinguished encodings of the components;
- c) For BIT STRINGS with unused trailing bits, if the type definition that specifies the bits have significance, then they are included in the encoding; otherwise they are not;
- d) For those character strings which allow it, escape sequences are generated to invoke and designate new register entries only when the register entry for the character currently being encoded is different from that currently designated for G0, C0, or C1. All designations shall be into G0 or C0. (It is assumed that all characters have entries in the ISO Registry of Coded Character Sets.)

NOTE - Rules b,c, and d are taken from [ISO/CD8825-3] (Nov. 1990), the ASN.1 Distinguished Encoding Rules. Other features of [ISO/CD8825-3], which conflict with [ISO9594-8] (e.g., length encoding for constructors), are NOT used by this IA.

It is recommended that whenever the SIGNED or SIGNATURE macro is to be applied to an object, the object should be transferred in its distinguished encoded form. In this way, when the resources required to encode or decode an object exceed the resources required to apply the SIGNED or SIGNATURE macro, a receiving entity may apply the macro immediately, thus realizing enhanced performance. However, if the macro application is unsuccessful, the object must be distinguished encoded and the macro re-applied to determine its actual success or failure.

8 Lower Layers Security

9 Upper Layers Security

This clause addresses the provision of security services in the Upper Layers. The Upper Layers Security Model specifies the interactions among the Upper Layers in providing and using security services [ISO/CD10745].

9.1 Security Mechanisms

9.1.1 Peer Entity Authentication

ACSE authentication extensions [ISO8649][ISO8650/1] support two-way authentication through the definition of a new functional unit. When this functional unit is employed, additional parameters are provided by the A-ASSOCIATE service to indicate this requirement and convey authentication information between entities. The ASN.1 definition for this information is given below:

```

from [ISO8650/1]:

Authentication      ::= SEQUENCE {
  mechanism-name     [0] IMPLICIT OBJECT IDENTIFIER OPTIONAL,
  authentication-value [1] CHOICE {
    charstring        [0] IMPLICIT GraphicString,
    bitstring          [1] IMPLICIT BITSTRING,
    external           [2] IMPLICIT EXTERNAL,
    other              [3] ANY DEFINED BY m Defined by Mechanism-name } }

```

Figure 1 - A-ASSOCIATE Authentication Information

These agreements define the following mechanisms for use with this ACSE functional unit:

simple-strong authentication mechanism.

9.1.1.1 Simple-Strong Authentication

9.1.1.1.1 Operation

The operation of the simple-strong authentication mechanisms are based upon [ISO9594-3] and [ISO9594-8] standards. The sending system is the entity requesting authentication of its identity, and the receiving system is the entity performing the authentication. The sending system supplies data for the ACSE authentication field of the A-ASSOCIATE primitive. The receiving ACSE obtains the ACSE authentication data from the A-ASSOCIATE PDU, and it performs the authentication check. If the check is successful, the association formation succeeds or fails depending upon other circumstances and parameters. The use of the ACSE authentication fields support both the simple and strong credentials variants of the [ISO9594-8] authentication exchanges.

Certificates for use with strong authentication must be compatible with [ISO9594-8].

Certificates procured for use with Internet Privacy Enhanced Mail [u][v][w][x] are completely compatible with [ISO9594-8] and may (subject to licensing restrictions) be used by the strong authentication mechanism. However, Privacy Enhanced Mail uses only a subset of the suggested [ISO9594-7] name forms, and might not support certain name forms of interest to specific OIW applications. Examples include Application Entity names and certain name forms defined by the North American Directory Forum in NADF-123 [y].

9.1.1.1.2 Data Structure

Mechanism Name

The following is the ASN.1 description of the authentication data structure for simple or strong authentication:

```
simple-strong-auth-mechanism OBJECT IDENTIFIER ::= {iso (1)
    identified-organization (3)
    oiw (14)
    secsig (3)
    authentication-mechanisms (3)
    simple-strong-identity-authentication (1)
}
```

Authentication Value

The authentication value is conveyed in the other option of the authentication-value field of ACSE authentication.

```
Authentication-Value ::=
    SEQUENCE OF DirectoryAbstractService.Credentials
```

This data type is defined in ASN.1 module DirectoryAbstractService of [ISO9594-3] as modified through resolution of Directory Defect Report Numbers 9594/052 and 063. The semantics of all fields are as specified in clause 8.1.2.1 of [ISO9594-3].

The Authentication-Value is defined as a SEQUENCE because it is permitted to pass credentials for multiple entities in the authentication value. It is the responsibility of the application to determine the specific meaning and use of multiple credentials in such a case. It is anticipated that specific applications (e.g., Network Management) would provide specifications for handling multiple credentials within their own clauses of this Part.

This authentication mechanism may employ any registered authentication algorithm; however, it is recommended that the algorithms identified in clause 7 be used.

9.1.1.1.3 Options

For the Simple Credentials option of Credentials, the following agreements apply. Conforming implementations are not required to employ the OPTIONAL validity sequence of the SimpleCredential data element. Receiving implementations that do not employ the validity sequence must reject an authentication

value which does contain this sequence. Conforming implementations shall employ the optional password field of the SimpleCredential data element.

Note that the password may be hashed using one way functions and the other validity fields. Password is either cleartext, Protected1 or Protected2 according to [ISO9594-8].

9.1.1.2 External Authentication Mechanisms

Externally defined authentication exchanges may employ the external [2] option of the authentication-value field of ACSE authentication. In this case it is recommended that the mechanism-name be omitted, with the particular mechanism in use being implied by the abstract syntax identified in the external construct.

9.1.1.2.1 Kerberos Version 5

One instance of an external authentication mechanism is the Kerberos mechanism defined in [z]. The Kerberos specification assigned the following object identifier to an abstract syntax suitable for use in this way:

[TBD]

10 Message Handling System (MHS) Security

All current MHS security relevant text appears in Part 8, clause 10.

11 Directory Services Security

12 Network Management Security

This clause outlines an approach to providing security services for OSI Network Management. The goals of this approach are to provide security in a manner that is simple and straight-forward to implement, and to avoid any unnecessary computational and managerial overhead. The approach also takes into consideration the need for different levels of security services within different network management domains, and the near term requirement for interoperability of network management entities over heterogeneous network types.

12.1 Threats

For the purpose of discussion, threats are divided into two categories: primary and secondary threats. Primary threats are those considered to be applicable to the full range of network management implementations, while secondary threats are considered to be applicable to the more limited range of highly secure implementations.

The primary threats to be protected against are the following:

- a) The masquerading of a manager or agent entity;
- b) The fabrication or modification of Common Management Information Protocol (CMIP) data units.

By countering primary threats, disruption of network management services by the casual user can be avoided.

The secondary threats to be protected against are the following:

- a) All primary threats;
- b) The disclosure of CMIP data units;
- c) The replay, reflection, reordering, insertion, or deletion of CMIP data units.

12.2 Security Services

12.2.1 Basic Security Services

The security services required to counter primary threats are:

- a) Peer entity authentication;
- b) Data origin authentication;
- c) Connectionless integrity.

Peer entity authentication is to occur during the establishment of an application association. If the association is successfully established, the underlying security mechanism provides information that is subsequently used in data origin authentication. There the information may be included in or, in some other way, transform the data units of subsequent exchanges so that they can be identified as originating from an authenticated entity. Both authentication security services are to be provided at the application level of the protocol.

Connectionless integrity insures that data units originating from an authenticated source are not modifiable without detection. When combined with a strong data origin authentication mechanism, the ability to fabricate new data units is also countered. Connectionless integrity may be provided at either the

application level of the protocol or within one of the lower levels of the protocol (i.e., transport or network).

12.2.2 Enhanced Security Services

The security services required to counter secondary threats are:

- a) All basic security services with the possible exception of connectionless integrity;
- b) Connectionless confidentiality;
- c) Connection integrity with or without recovery.

Both connectionless confidentiality and connection integrity may be provided at either the application level of protocol or within one of the lower levels of protocol. The latter provision is assumed here. Enhanced security services are not discussed further in this note, but to be issued as a requirement for the lower layer protocol and service standards, and according to functional standards to be developed.

12.3 Security Mechanisms

12.3.1 Peer Entity Authentication

Peer Entity Authentication will use the ACSE authentication mechanism and associated data types as defined in clause 9 of this Part of the IAs. The specific authentication mechanism to be supported is the Simple-Strong Authentication defined in 9.1.1.1.

Support of ACSE authentication is optional.

12.3.2 Connectionless Integrity

Editor's Note - Proposed text for this clause appears in WIA Part 12, clause 12.3.2.

Annex A (normative)

ISPICS Requirements List

Annex B (normative)

Errata**Table 1 - SIA Part 12 changes**

NO. OF ERRATA	TYPE	REFERENCED DOCUMENT	CLAUSE	NOTES

Annex C (informative)

Bibliography

REFERENCES FOR SECURITY ALGORITHMS

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Annex D (informative)

ElGamal

The information in this subclause includes a tutorial description of the ElGamal scheme for digital signature using the notation defined in the Directory Documents, [ISO9594-8]. It is intended that much of the tutorial information provided in this subclause will be moved to the security agreements sometime in the future.

D.1 Background

The ElGamal digital signature scheme is based on earlier work done by Diffie and Hellman [b] in which it was suggested that a likely candidate for a one-way function is the *discrete exponential function*

$$f(x) = \alpha^x \pmod{p} \quad (1)$$

where x is an integer between 1 and $p-1$ inclusive, where p is a very large prime number, and where α is an integer such that $1 \leq \alpha < p$ and $\{\alpha \pmod{p}, \alpha^2 \pmod{p}, \dots, \alpha^{p-1} \pmod{p}\}$ is equal to the set $\{1, 2, \dots, p-1\}$. In algebraic terminology, such an α is called a *primitive element*. References on the topic of primitive roots and elements are [aa] and [ab].

Now, in the real number system, if $y = \alpha^x$, then by definition of the logarithm we can solve for x using $x = \log_{\alpha}(y)$. The same idea extends to solving eq (1) for x so that inverting $f(x)$ requires calculating *discrete logarithms*. The reason Diffie and Hellman suspected eq (1) is one-way is that for suitable p , it is computationally difficult to invert $f(x)$. According to the current state of the art, computing discrete logs for suitable p has been found to require a number of operations roughly equivalent to

$$\exp(\sqrt{c b \ln b}) \quad (2)$$

where b is the number of bits in p , and c is estimated at $c = .69$ according to [ac]. This can be compared to only about $2 \log_2 p$ multiplications for discrete exponentiation. If in fact the best known algorithm for computing discrete logs is near optimal then Expression (2) is a good measure of the problem's complexity (for a properly chosen p) and the discrete exponential function has all the qualities of a one-way function as described by Diffie and Hellman.

D.2 Digital Signature

Private Key: X_s denotes the private key for user X . X_s is a randomly chosen integer which user X keeps secret.

Public Key: X_p denotes the public key for user X and is calculated using the corresponding private key such that

$$X_p = \alpha^{X_s} \pmod{p} \quad (3)$$

where

- a) p is a prime satisfying the requirements listed in 12.2.2.4.
- b) α is a primitive element mod p .
- c) Note that p and α could be used globally, but because they should be easily changeable (see 12.2.2.4 for information about why these two parameters should be easily changeable) it would probably be preferable for each user to choose his/her own p and α . If users choose their own, then p and α must be made available to the recipient for use in the signature verification process.

Signing Procedure: Suppose user A wants to sign a message intended for recipient B . The basic idea is to compute a two part signature (r, s) for the message m such that

$$\alpha^{h(m)} = (A_p)^r r^s \pmod{p} \quad (4)$$

where h is a one-way hash function.

Compute the signature (r, s) as follows.

- a) Choose a random number k , uniformly between 0 and $p-1$ such that k and $p-1$ have no common divisor except 1 (i.e., $\gcd(k, p-1) = 1$).
- b) Compute r such that

$$r = \alpha^k \pmod{p} \quad (5)$$

- c) Use r to solve for the corresponding s as follows.

- 1) rewrite eq (4) using eq (5) and the definition of the public key to get

$$\alpha^{h(m)} = \alpha^{(A_p)^r} \alpha^{ks} \pmod{p} \quad (6)$$

Combining exponents, get

$$\alpha^{h(m)} = \alpha^{(A_p)^r + ks} \pmod{p} \quad (7)$$

eq (7) implies that

$$h(m) = (A_p)^r + ks \pmod{p-1} \quad (8)$$

Note that eq (8) has a single solution for s because k was chosen such that $\gcd(k, p-1) = 1$. See [ad] for supporting theorem.

- 2) now solve for s and get

$$s = I(h(m) - (A_p)^r) \pmod{p-1} \quad (9)$$

where I is computed such that $k * I \equiv 1 \pmod{p-1}$.

The ElGamal signature is comparable in size to the corresponding RSA signature.

D.3 Verification

The recipient receives Ap , m , r , s , α , and p and computes both sides of eq (4) and then compares the results.

D.4 Known Constraints on Parameters

The following list of constraints is the result of a search of current literature and may not be complete:

- a) p must be prime;
- b) p must be large.

Note that Expression (2) can be used to speculate on the level of security afforded by crypto systems based on the discrete log problem. Breaking the ElGamal scheme has not been proven to be equivalent to finding discrete logs, but if we assume equivalence then we can estimate how large p should be for a desired level of security.

For instance, suppose we wanted to use Expression (2) to decide how large p should be so that we can be reasonably sure the system cannot be broken (using the best *known* algorithm) in a practical amount of time. To be on the conservative side, we decide we want to protect against a special purpose machine that can perform 10^{15} operations per second. Specifically, we want to know how large p should be so that such a machine would take at least one year to break the system.

In one year, the hypothetical machine can perform 3×10^{22} operations. To find the size of the desired p , solve the following equation for b .

$$\exp(\sqrt{cb \ln b}) = 3 \times 10^{22} \quad (10)$$

We get $b \sim 606$. This is the number of bits in the desired p . So, the magnitude of the desired p is about 2^{606} which is roughly 266×10^{180} .

Hence, to be reasonably sure of attaining the desired level of security, we find a prime number greater than 266×10^{180} which satisfies all the other criteria listed in this subclause. Our confidence, however, is strictly based on the assumption that breaking ElGamal is as difficult as finding discrete logs and the assumption that the best known algorithm for finding discrete logs is near optimal.

- c) p should occasionally be changed. This requirement is discussed in [ae] and is related to the discovery of new algorithms for computing discrete logarithms in $GF(p)$.
- d) $p-1$ must have at least one large prime factor. This requirement is discussed in [ae] and is imposed by the Silverman-Pohlig-Hellman algorithm which computes discrete logarithms in $GF(p)$ using on the order \sqrt{r} operations and a comparable amount of storage, where r is the largest prime factor in $p-1$.
- e) p should not be the square of any prime. A subexponential-time algorithm for computing discrete

logarithms in $GF(p^2)$ has been found. See [af]for details.

Annex E (informative)

ANNEX FOR SECURITY ALGORITHMS

```

OIWSECSIGAlgorithmObjectIdentifiers {iso(1) identified-organization(3)
                                     oiw(14) secsig(3)
                                     oIWSECSIGAlgorithmObjectIdentifiers(1)}

DEFINITIONS =
BEGIN

EXPORTS
-- to be determined

IMPORTS
-- none

-- category of information object
-- defining our own here; perhaps the definition should be imported from
-- {joint-iso-ccitt ds(5) modules(1) usefulDefinitions(0)}

algorithm      OBJECT IDENTIFIER ::= {iso(1) identified-organization(3)
                                     oiw(14) secsig(3) algorithm(2)}

-- macros

-- taken from {joint-iso-ccitt ds(5) modules(1) authenticationFramework(7)}
ALGORITHM MACRO      ::=
BEGIN
TYPE NOTATION        ::= "PARAMETER" type
VALUE NOTATION        ::= value(VALUE OBJECT IDENTIFIER)
END -- of ALGORITHM

-- algorithms

md4WithRSA ALGORITHM
  PARAMETER NULL
  ::= {algorithm 2}

md5WithRSA ALGORITHM
  PARAMETER NULL
  ::= {algorithm 3}

md4WithRSAEncryption ALGORITHM
  PARAMETER NULL
  ::= {algorithm 4}

desECB ALGORITHM
  PARAMETER NULL
  ::= {algorithm 6}

desCBC ALGORITHM
  PARAMETER CBCParameter
  ::= {algorithm 7}

CBCParameter ::= IV

desOFB ALGORITHM
  PARAMETER FBParameter
  ::= {algorithm 8}

desCFB ALGORITHM
  PARAMETER FBParameter
  ::= {algorithm 9}

```



```
FBParameter ::= SEQUENCE {  
    iv IV,  
    numberOfBits NumberOfBits  
}
```

```
NumberOfBits ::= INTEGER    -- Number of feedback bits (1 to 64 bits)
```

Editor's Note - Check FIPS PUB 81 for allowed ranges of feedback bits and specify ranges here as a comment.

```
IV ::= OCTET STRING  -- 8 octets
```

```
desMAC ALGORITHM  
    PARAMETER MACParameter  
    ::= {algorithm 10}
```

```
MACParameter ::= INTEGER    -- Length of MAC (16, 24, 32, 40, 40 or 64 bits)
```

Editor's Note - Check FIPS PUB 113 for allowed

```
END -- of Algorithm Object Identifier Definitions
```


Stable Implementation Agreements for Open Systems Interconnection Protocols: Part 13 - OS Security

Output from the September 1992 Open Systems
Environment Implementors' Workshop (OIW)

SIG Chair:
SIG Editor:

**Dr. James Galvin, Trusted Information Systems
John Hooder, NAVY, Dr. Mohammad Mirhakkak, MITRE**

Foreword

This part of the Stable Implementation Agreements was prepared by the Security Special Interest Group (SECSIG) of the Open Systems Environment Implementors' Workshop (OIW). See Procedures Manual for Workshop charter.

Text in this part has been approved by the Plenary of the above-mentioned Workshop. This part replaces the previously existing chapter on this subject. There is no significant technical change from this text as previously given.

Future changes and additions to this version of these Implementor Agreements will be published as change pages. Deleted and replaced text will be shown as struck. New and replacement text will be shown as shaded.

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0 Introduction 1

Part 13 - OS Security

0 Introduction

This part is reserved for future stable Security agreements. Previous Stable Agreements may be found in part 12 of this document.

Stable Implementation Agreements for Open Systems Interconnection Protocols: Part 14 - Virtual Terminal

Output from the September 1992 Open Systems
Environment Implementors' Workshop (OIW)

SIG Chair:	Luke Lucas, Control Data Corporation
SIG Editor:	Scott Wattum, Digital Equipment Corporation

Foreword

This part of the Stable Implementation Agreements was prepared by the Virtual Terminal Special Interest Group (VTSIG) of the Open Systems Environment Implementors' Workshop (OIW). See Procedures Manual for Workshop charter.

Text in this part has been approved by the Plenary of the above-mentioned Workshop. This part replaces the previously existing chapter on this subject.

Three normative annexes are given.

Future changes and additions to this version of these Implementor Agreements will be published as change pages. Deleted and replaced text will be shown as struck. New and replacement text will be shown as shaded.

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Part 14 - Virtual Terminal

0 Introduction

The OSI Implementors' Workshop Virtual Terminal (VT) SIG is making implementation agreements for the OSI Basic Class VT Service and Protocol, ISO 9040 and ISO 9041.

These implementation agreements fall into the following categories:

Functionality to be implemented, i.e., functional units, etc.

Identification and specification of VT profiles to be supported by conforming implementations.

Agreements with regard to implementation issues not specified in ISO 9040 and ISO 9041.

Resolution of problems with ISO 9040 and ISO 9041 identified during implementation.

Statement of requirements to meet conformance to these agreements.

1 Scope

1.1 Phase Ia Agreements

The Telnet profile is intended to support the following usage:

- a) a simple line at a time or character at a time dialogue;
- b) an application level gateway supporting Internet Telnet and ISO VTP interoperation.

The Transparent profile supports the exchange of uninterpreted sequences of characters. This includes support of VT-users who wish to control terminals directly through the use of embedded control characters and escape sequences.

1.2 Phase Ib Agreements

The Forms profile is intended to support forms-based applications with local entry and validation of data by the terminal system. This profile is now aligned with the EWOS VT EG Functional Standard.

1.3 Phase II Agreements

The X.3 profile supports functionality similar to the CCITT recommendations and could be used to implement an X.3 to ISO-VT gateway.

See Working Agreements regarding other Phase II profiles.

1.4 Status

1.4.1 Status of phase Ia

Phase Ia of the VT Agreements was stabilized May 5, 1988. This phase covers the Telnet and Transparent profiles. No future enhancements will be made to this phase.

1.4.2 Status of phase Ib

Phase Ib of the VT Agreements was first stabilized December 16, 1988. This phase covers the Forms profile. Alignment with EWOS required substantial modifications which were ratified September 15, 1989.

1.4.3 Status of phase II

Phase II is still in progress and includes the remaining profile work for the Scroll and ~~S-mode Paged~~ profiles.

~~The S-mode Paged Profile is being progressed as PDISP 11187-2 (AVT-23 S-mode Paged Profile).~~

The X.3 profile of phase II was stabilized December 15, 1989.

The Generalized Telnet profile of phase II was stabilized December 13, 1991.

2 Normative References

ISO 9040:1990, *Information technology - Open Systems Interconnection - Virtual Terminal Basic Class Service.*

ISO 9041-1:1990, *Information technology - Open Systems Interconnection - Virtual Terminal Basic Class Protocol - Part 1: Specification.*

ISO 9834-4, *Information technology - Open Systems Interconnection*
- *Procedures for the Operation of OSI Registration Authorities*
- *Part 4: Register of VTE Profiles.*

ISO 9834-4, *Information technology - Open Systems Interconnection*
- *Procedures for the Operation of OSI Registration Authorities*
- *Part 5: Register of VT Control Object Definitions.*

3 Status

This version of the agreements was completed in December 1991.

4 Errata

Editor's Note - "Defect Report" material may be included here, including versions of implementor agreements to which it applies.

Table 1 - Technical Errata

06/90-1	Forms Profile. The "FEICO Update Syntax" ASN.1 comment which follows the definition of the PriValue type was corrected to support multi-octet repertoires.
06/90-2	Forms Profile. The descriptive text for the Field Entry Instruction Violation FEE was corrected to indicate that both an entry-control index and a FEPR index are required to identify the FEPR concerned.
06/90-3	Forms Profile. The descriptive text and update syntax for the Violation FEC were corrected to indicate that both a FEICO-name and an index are required to identify a FEIR.
06/90-4	Forms Profile. The update syntax for the writeString FER was corrected to align with the descriptive text for this FER.
06/90-5	Forms Profile. The descriptive text for the repertoire assignment profile argument was corrected to properly identify the default value as the GL set ISO 2375 Reg. No. 6 (ASCII).
06/90-6	Forms Profile. The concept of a "current keystroke" was inserted into the definition of the FEICO to remove ambiguity in the use of the ST and UT COs. Various FEEs, FECs and FERs were redefined.
12/91-1	Telnet Profile. Change x-absolute value from "no" to "yes."
03/92-1	Generalized Telnet Profile. Add conformance statement regarding the requirement to accept negotiation of Suppress GoAhead.
03/92-2	Generalized Telnet Profile. Rework Definitive Note 8, expanding the repertoire negotiation capability to allow negotiation for the use any one of a number of non-binary repertoires.
03/92-3	X.3 Profile. Correct processing of terminal break so that it aligns with the procedures of ccitt X.29.

Table 2 - Alignment Errata

06/90-7	Forms Profile. A definitive note was added to define how the host is notified of the current entry location when data entry terminates and the VTE-parameter access-outside-fields has the value "allowed."
06/90-8	Forms Profile. Three font-assignment profile arguments were added to accomodate INTAP requirements.
09/90-1	Forms Profile. The emphasis subattribute "h" was added with values "F" (Framed) and "C" (Encircled).
09/90-2	Telnet Profile. Four editorial comments were incorporated to align with the corresponding EWOS Functional Standard.

Table 3 - Editorial Errata

06/90-9	Forms Profile. Two definitive notes were added to clarify the secondary attributes comparison mechanisms for the FEIs and FECs that test equality of characters.
06/90-10	Forms Profile. A definitive note was added to clarify the effect of associating multiple Character-oriented FEIs of the same type with the same field.
06/90-11	Forms Profile. An introductory paragraph in the section "Field Entry Condition Definitions" was rewritten for clarification.
06/90-12	Forms Profile. The descriptive text for the Write String field entry reaction was modified to indicate precisely how and where the associated string is to be written.
09/90-3	X3 Profile. The reference to COs P3 and P4 contained in comments relating to DEVICE-1 were corrected to reference elements 3 and 4 of the PAD CO.
12/90-1	X3 Profile. Changes were made to correct editorial errors discovered during the progression of the EWOS X3 Profile Functional Standard.
09/91-1	Scope, Status, and References clauses were updated.
09/92-1	Status clause was updated.

5 Conformance

Conformant VT implementations are required to support the ISO 9041 Clause 13 requirements plus the additional conformance requirements identified below.

Table 4 shows conformance status for VT facilities which are optional in the ISO VT standard. The terms used in the figure are defined as indicated below:

- a) "Mandatory" indicates that the facility must be provided by all implementations which conform to these agreements;
- b) "Optional" indicates that the VT facility is not required to meet minimum conformance requirements but has been identified as providing additional useful capabilities;
- c) "Profile Dependent" indicates that the requirement for the facility, if any, is included in the profile definitions;
- d) "Not Addressed" indicates that the VT facility is outside the scope of these agreements.

Table 4 - Conformance Status for VT Facilities

Conformance Status	Mandatory	Optional	Profile Dependent	Not Addressed
Switch Profile ²⁾		X		
Multiple Interaction Negotiation ²⁾				X
Negotiated Release ²⁾				X
Urgent Data ²⁾		X		
Break ²⁾	X			
Delivery Control ¹⁾			X	
Enhanced Access Rules ²⁾			X	
Structured COs ²⁾			X	
Blocks ²⁾				X
Fields ²⁾			X	
RIOs ²⁾			X	
S-mode			X	
A-mode			X	
Mode Switching Capability		X		
1) It is not anticipated that new profiles will use quarantined delivery control. 2) Functional Units.				

For each mode of operation (A-mode and S-mode) which is implemented, the default profile for that mode as defined in ISO 9040 must be supported. Implementations that support A-mode must support the A-mode default profile and at least one additional Workshop approved A-mode profile. The Transparent profile does not count as an additional A-mode profile. Implementations that support S-mode must support the S-mode default profile and at least one additional Workshop approved S-mode profile.

For each profile implemented, VTE parameter ranges or values specified in the Workshop-agreed profile and associated notes must be supported.

6 Protocol

6.1 Protocol Elements

All protocol elements required by the ISO 9040 VT kernel and Break functional units are selected.

All protocol elements required by the Switch Profile functional unit are selected if this functional unit is used. See Table 4.

All protocol elements required by the Urgent Data functional unit are selected if this functional unit is used. See Table 4.

6.2 Mapping of Protocol Elements

Mapping of protocol elements on to ACSE or Presentation Services is as defined in ISO 9041.

6.3 Protocol Data Unit Structure

Protocol data unit structure is as defined in ISO 9041.

7 OIW Registered Control Objects

The following Control Objects are used by more than one profile. Some of the CO parameters are left with undefined values that must be assigned by the profile in which the Control Object is used.

7.1 Sequenced Application (SA)

This is a Control object used to convey signals from the application to the terminal in sequence with other updates.

7.1.1 Entry Number

To be supplied by Registration Authority.

7.1.2 Name of Sponsoring Body

OSI Implementors' Workshop (OIW), VTSIG.

7.1.3 Date

The date of submission of this proposal is September 15, 1989.

7.1.4 Identifier

oiw-vt-co-misc-sa OBJECT IDENTIFIER ::= {oiw-vt-co-misc sa(0)}

7.1.5 Descriptor Value

"OIW VT CO for conveying Sequenced Application Signals"

7.1.6 CO Parameters

CO-structure 1
CO-priority "normal"
CO-category "symbolic"
CO-size 11

7.1.7 CO Values and Semantics

Table 5 lists the allowed symbolic values together with the integers used to reference these values in the ASN.1 update syntax of ISO 9041:

Table 5 - SA/UA CO values and semantics.

Symbolic Value	Integer Value
audible_alarm	0
newlines_enabled	1
newlines_disabled	2
restore	3
visual_alarm	4
keypad_enabled	5
keypad_disabled	6

keyboard_locked	7
keyboard_unlocked	8
device_disconnect	9
break_signal	10

The semantics of each value must be specified in the VTE profile which references this CO.

7.1.8 Additional Information

None.

7.1.9 Usage

Defined in profile.

7.2 Unsequenced Application (UA)

This is a Control object used to convey urgent signals from the application to the terminal.

7.2.1 Entry Number

To be supplied by Registration Authority.

7.2.2 Name of Sponsoring Body

OSI Implementors' Workshop (OIW), VTSIG.

7.2.3 Date

The date of submission of this proposal is September 15, 1989.

7.2.4 Identifier

oiw-vt-co-misc-ua OBJECT IDENTIFIER::= {oiw-vt-co-misc ua(1)}

7.2.5 Descriptor Value

"OIW VT CO for conveying Unsequenced Application Signals"

7.2.6 CO Parameters

CO-structure	1
CO-priority	"urgent"
CO-category	"symbolic"
CO-size	11

7.2.7 CO Values and Semantics

Same as in SA.

7.2.8 Additional Information

None.

7.2.9 Usage

Defined in profile.

7.3 Sequenced Terminal (ST)

A keyboard can generate many signals that may be given special meaning to the application. This CO is general enough to convey any keyboard event.

7.3.1 Entry Number

To be supplied by Registration Authority.

7.3.2 Name of Sponsoring Body

OSI Implementors Workshop (OIW), VTSIG.

7.3.3 Date

The date of submission of this proposal is September 15, 1989.

7.3.4 Identifier

oiw-vt-co-misc-st OBJECT IDENTIFIER ::= {oiw-vt-co-misc st(2)}

7.3.5 Descriptor Value

"OIW VT CO for conveying Sequenced Terminal Signals"

7.3.6 CO Parameters

CO-structure 1
 CO-priority "normal"
 CO-category "integer"
 CO-size 65535

7.3.7 CO Values and Semantics

The values of the CO are composite, with values from Table 6 giving meaning to the values in the hex range 00-FF when added to them.

Table 6 - ST/UT CO composite values

hex value	meaning
100	special key - labeled ¹⁾
200	function key depressed
400	control key depressed
800	shift key depressed
1000	alt key depressed
1) possible special key values are as defined by the STCO ASN.1 module.	

The special key and the function key are mutually exclusive. If neither the function keys nor the special keys are pressed, then the value in the hex range 00-FF will be that of the normal, unshifted code combination generated by the alpha-numeric key. Values in the hex range 00-FF are not valid values for the data element of this Control Object.

The control, shift, and alt keys may appear in any combination with the special or function keys.

The shift key must occur in combination with at least one of the other keys in the above table to cause the value to fall outside the repertoire of the display object.

When the special key is depressed, the value of the CO content will be as given in the ASN.1 module below for the value in the hex range of 00-FF. Otherwise, the value will be defined to be the IA5 value associated with the key.

STCO DEFINITIONS ::= BEGIN

Key ::= INTEGER {

break	(0),	bell	(1),	backSpace	(2),
tab	(3),	backTab	(4),	lineFeed	(5),
carReturn	(6),	cancel	(7),	substitute	(8),
escape	(9),	plus	(10),	minus	(11),
multiply	(12),	divide	(13),	leftArrow	(14),
rightArrow	(15),	upArrow	(16),	downArrow	(17),
insert	(18),	delete	(19),	insertLine	(20),
deleteLine	(21),	home	(22),	end	(23),
pageUp	(24),	pageDown	(25),	pa1	(26),
pa2	(27),	pa3	(28),	help	(29),
statusProcess	(30),	interruptProcess	(31),	terminateProcess	(32),
abortOutput	(33),	formFeed	(34),	clear	(35),
print	(36),	refresh	(37),	systemRequest	(38),
endOfRecord	(39),	endOfFile	(40),	suspendProcess	(41)

-- Names for combination keystrokes are formed by converting the
 -- initial letter to upper case and prefixing with 'ctrl', 'shift' or
 -- 'alt', which adds 1024, 2048 or 4096 respectively to the value.
 -- These prefixes may be used in combination with one another by a
 -- repetition of this conversion process, provided that they appear
 -- from left to right in the order 'ctrl', 'shift', 'alt'. ASN.1
 -- formally does not allow such descriptive additions but it would be
 -- very lengthy to write them all in full -- }

END *(STCO DEFINITIONS)*

VTE profile definitions may refer to this module for convenience in describing semantics.

7.3.8 Additional Information

None.

7.3.9 Usage

Defined in profile.

7.4 Unsequenced Terminal (UT)

Keyboard events may need to be conveyed urgently, out of sequence with normal updates. This CO is used to signal such events from the terminal to the application.

7.4.1 Entry Number

To be supplied by the Registration Authority.

7.4.2 Name of Sponsoring Body

OSI Implementors Workshop (OIW), VTSIG

7.4.3 Date

The date of submission of this proposal is September 15, 1989.

7.4.4 Identifier

oiw-vt-co-misc-ut OBJECT IDENTIFIER ::= {oiw-vt-co-misc ut(3)}

7.4.5 Descriptor Value

"OIW VT CO for conveying Unsequenced Terminal Signals"

7.4.6 CO Parameters

CO-structure	1
CO-priority	"urgent"
CO-category	"integer"
CO-size	65535

7.4.7 CO Values and Semantics

Same as in ST.

7.4.8 Additional Information

None.

7.4.9 Usage

Defined in profile.

8 OIW Defined Profiles

These profiles are defined using the conventions specified in Annex A of ISO 9040.

8.1 Telnet Profile

OIW VTE-Profile Telnet-1988 (r1, r2)

8.1.1 Introduction

This profile provides support for TELNET-like operation for users of the ISO Virtual Terminal Service. It is based on the IS version of ISO 9040 and ISO 9041.

8.1.2 Association Requirements

8.1.2.1 Functional Units

The Urgent Data Functional Unit is optional, but should be used whenever available.

8.1.2.2 Mode

This is an A-mode profile.

8.1.3 Profile Body

Display-objects = *(double occurrence)*

```
{
  {
    display-object-name = D, *(DISPLAY)*
    do-access           = "WACA",
    dimensions          = "two",
    x-dimension         =
    {
      x-bound           = "unbounded",
      x-addressing      = "no constraint",
      x-absolute        = "yes",          *(See Definitive Note 4)*
      x-window          = profile-argument-r1
    },
    y-dimension         =
    {
      y-bound           = "unbounded",
      y-addressing      = "higher only",
      y-absolute        = "no",
      y-window          = 1
    },
    erasure-capability = "yes",
    repertoire-capability = 2,
    repertoire-assignment = profile-argument-r2,
    repertoire-assignment = <ESC> 2/5 2/15 4/2
  },
  {
    display-object-name = K, *(KEYBOARD)*
    do-access           = "WACI",
    dimensions          = "two",
    x-dimension         =
    {
      x-bound           = "unbounded",
      x-addressing      = "no constraint",
      x-absolute        = "yes",          *(See Definitive Note 4)*
```

```

        x-window      = profile-argument-r1
    },
    y-dimension      =
    {
        y-bound       = "unbounded",
        y-addressing   = "higher only",
        y-absolute     = "no",
        y-window       = 1
    },
    erasure-capability = "yes",
    repertoire-capability = 2,
    repertoire-assignment = profile-argument-r2,
    repertoire-assignment = <ESC> 2/5 2/15 4/2
}
},

```

Control-objects = *(multiple occurrence)*

```

{
    { *(SYNCHRONIZE)*
        CO-name      = SY,
        CO-access     = "NSAC",
        CO-category   = "symbolic",
        CO-size       = 1,
        CO-priority    = "urgent"
    },
    { *(DISPLAY-SIGNAL)*
        CO-name       = DI,
        CO-access      = "WACA",
        CO-category    = "boolean",
        CO-size        = 5,
        CO-priority    = "normal",
        CO-trigger      = "selected"
    },
    { *(KEYBOARD-SIGNAL)*
        CO-name        = KB,
        CO-access       = "WACI",
        CO-category     = "boolean",
        CO-size         = 5,
        CO-priority     = "normal",
        CO-trigger       = "selected"
    },
    { *(NEGOTIATION BY INITIATOR)*
        CO-name         = NI,
        CO-access        = "WACI",
        CO-category      = "boolean",
        CO-size          = 4,
    },
}

```

```

        CO-priority    = "normal",
        CO-trigger     = "selected"
    },
    { *(NEGOTIATION BY ACCEPTOR)*
        CO-name        = NA,
        CO-access       = "WACA",
        CO-category     = "boolean",
        CO-size         = 4,
        CO-priority     = "normal",
        CO-trigger      = "selected"
    },
    { *(GO-AHEAD)*
        CO-name         = GA,
        CO-access       = "NSAC",
        CO-category     = "boolean",
        CO-size         = 1,
        CO-priority     = "normal",
        CO-trigger      = "selected"
    }
},

Device-objects = *(double occurrence)*
{
    {
        device-name = DISPLAY-DEVICE,
        device-display-object = D,
        device-default-CO-initial-value = 1."true",*("on")*
        device-minimum-X-array-length = 1,*(no constraint)*
        device-minimum-Y-array-length = 1,*(no constraint)*
        device-control-object = SY,
        device-control-object = NA,
        device-control-object = DI,
        device-control-object = GA,
        *(SYNC,NEGOTIATE-ACCEPTOR,DISPLAY-SIGNAL,
            GO-AHEAD)*
        device-default-CO-access = "WACA",
        device-default-CO-priority = "normal"
        *(other device object parameters assume corresponding DO values)*
    },
    {
        device-name = KEYBOARD-DEVICE,
        device-display-object = K,
        device-default-CO-access = "WACI",
        device-default-CO-priority = "normal",
        device-default-CO-initial-value = 1."true",*("on")*
        device-minimum-X-array-length = 1,*(no constraint)*
    }
}

```



```

device-minimum-Y-array-length = 1,*(no constraint)*
device-control-object = SY,
device-control-object = NI,
device-control-object = KB,
device-control-object = GA,
                        *(SYNC,NEGOTIATE-INITIATOR,KEYBOARD-SIGNAL,
                          GO-AHEAD)*
*(other device object parameters assume corresponding DO values)*
}

```

```

},
Type of delivery control = "simple-delivery-control."

```

8.1.4 Profile Arguments

- r1 - is used to represent the line length as the value of VTE parameter x-window for both display objects. This argument is mandatory and takes a nonnegative integer value. This argument is identified by the identifier for x-window for display object D.
- r2 - is used to designate the default repertoire for both display objects. This argument is optional, if not present the full US ASCII set is the default. This argument is identified by the identifier for repertoire assignment for the display object D.

8.1.5 Profile dependent Control Object Information

This profile does not reference any Control Objects which are not defined within this profile.

8.1.6 Profile Notes

8.1.6.1 Definitive Notes

1. Booleans in the KB and DI control objects are used in this profile to correspond to TELNET commands as follows:

Table 7 - KB/DI CO value definitions

Control Object	Boolean	TELNET
DI/KB	1	IP
DI/KB	2	AO
DI/KB	3	AYT
DI/KB	4	DM
DI/KB	5	BREAK

The equivalent of a TELNET command is achieved by selecting the boolean that corresponds to the desired TELNET command. Selecting a boolean in the DI or KB control object means setting the value of the desired boolean to "true." The usage of the mask element of the boolean update is as specified in ISO 9041.

2. The equivalent of a TELNET SYNCH command is achieved by updating the SY control object with the single symbolic value of "SYNCH" (which is mapped onto the integer value 1), and immediately updating the DI (or KB) control object selecting the DM boolean. IP, AO, AYT, or BREAK commands may be accompanied by a SYNCH command by updating the SY control object and then updating the DI or KB control object selecting both the DM and the other desired boolean. When an update to the SY control object is received subsequent display object updates are discarded until an update to the DI or KB control object is received selecting the DM bit. If a VT-BREAK is received after an SY CO update has been received and prior to the corresponding DI or KB CO update selecting the DM boolean, the discarding of updates is terminated. This is necessary because the VT-BREAK may have caused the DI or KB CO update to be purged.
3. The NI and NA control objects are used to emulate the TELNET option negotiation facility. The facility is symmetric, allowing either party to open negotiation for a change of mode, and every negotiation must be accepted or rejected by the opposite party. The rules for negotiation for each of the option controls are as stated in RFC 854 and as given below:
 - a. Only open negotiation for a change from the current state;
 - b. Only acknowledge negotiation for a change from the current state;
 - c. Do not send any object updates with a negotiation outstanding except an update to the NI (or NA) control object to acknowledge negotiation.

For full symmetry, both the NI and NA control objects have the same value definition and consist of 4 booleans with the semantics given in Table 8.

Table 8 - NI/NA CO value definition

BIT	Option	Value
1	Remote Echo	"false" Echo is Local; "true" Echo is remote
2	Suppress Go Ahead	"false" GO Ahead; "true" Suppress Go Ahead
3	Binary WACA	"true" use binary WACA; "false" use default or negotiated repertoire for WACA display object
4	Binary WACI	"true" use binary WACI; "false" use default or negotiated repertoire for WACI display object

Booleans 3 and 4 control the use of the Transparent character set for the D and K display objects respectively. A value of "true" indicates the use of the binary repertoire; "false" indicates the use of the negotiated repertoire. When a party wants to change a repertoire assignment, it must complete a successful TELNET negotiation to change the option control. Then the party with the access rights to the display object in question is required to perform the corresponding secondary attribute modal update.

4. The TELNET EC (erase character) command will be mapped to a pointer relative ($x := x-1$) update and an erase current update. This is the only instance when backward explicit addressing is permitted.

The TELNET EL (erase line) command will be mapped to an erase-full-x-array update (an erase operation where the extent is defined as $\langle \text{"start-x"}, (Y_c, X_c-1) \rangle$ and a pointer update to set $x = 1$. This is the only instance when absolute explicit addressing is permitted.

5. The X address of the pointer can be moved forward only by implicit pointer addressing. Addressing of the Y dimension is limited to the next X-array update operation.
6. The VT next X-array update operation will be sent in place of the TELNET NVT "CR,LF" sequence.
7. While the "binary" repertoire is being used no mapping to pointer addressing or erase operations will be done.
8. The repertoire designation "7-bit ASCII (G0+C0)" refers to the repertoire invoked by ISO 2022 defined character set designating escape sequences $\langle \text{ESC} \rangle 2/8 4/2$, "void," $\langle \text{ESC} \rangle 2/1 4/0$. The repertoire designation "7-bit ASCII (G0 only)" refers to the repertoire invoked by the ISO 2022 defined character set designating escape sequence $\langle \text{ESC} \rangle 2/8 4/2$. The designation "binary" refers to the "Virtual Terminal Service Transparent Set" registered in the International Register under ISO 2375 register value 125 and invoked by the escape sequence $\langle \text{ESC} \rangle 2/5 2/15 4/2$.
9. No termination event list is specified so that data buffering and delivery can be controlled according to context. If local echoing is enabled, the local newline or enter event shall trigger a VT-DELIVER request. With remote echo a timeout or buffer length may be used to trigger a VT-DELIVER request.

This buffer length may be 1.

8.1.6.2 Informative Notes

1. Users of this profile should refer to the TELNET specification (MIL-STD-1782) and RFCs 854 and 855 for semantics of the TELNET commands. These documents can be obtained by contacting SRI International, DDN Network Information Center, 333 Ravenswood Ave., Menlo Park, CA 94025, (415) 859-3695.
2. An update to the GA control object is equivalent to the TELNET Go Ahead command.
3. If the "go ahead" facility has been negotiated then following a VT-BREAK, only the association acceptor has the right to send data. In the event of VT-BREAK the echo control objects are reinitialized to "false," meaning local echo. If remote echo is desired it must be re-negotiated following VT-BREAK.
4. Negotiation of TELNET options other than echo, transmit binary, and SUPPRESS GO AHEAD is not supported by this profile. Negotiations for these three options can take place at any time during a session.

8.1.7 Specific Conformance Requirements

The following character sets are required:

The G0 character set for U.S. 7-bit ASCII (values 32-126);

The full U.S. 7-bit ASCII (values 0-127).

The transparent character set, see Definitive Note 8 in clause 8.1.6.1.

8.2 Transparent Profile

OIW VTE-Profile Transparent-1988 (r1)

8.2.1 Introduction

This profile is intended to provide a transparent mode of operation which allows VT-users to exchange transparently uninterpreted sequences of characters but with the added benefit of delivery control to enable the VT-users to determine when the character sequences are to be delivered.

This profile may be used when VT-users wish to control terminals directly through the use of embedded control characters.

8.2.2 Association Requirements

8.2.2.1 Functional Units

No additional functional units are required by this profile.

8.2.2.2 Mode

This is an A-mode profile.

8.2.3 Profile Body

```

Display-objects *(double occurrence)* =
{
    {
        display-object-name = D1,
        do-access           = "WACA",
        dimensions          = "one",
        x-dimension        =
            {
                x-addressing = "not-permitted"
            },
        repertoire-assignment = profile-argument-r1
    },
    {
        display-object-name = D2,
        do-access           = "WACI",
        dimensions          = "one",
        x-dimension        =
            {
                x-addressing = "not-permitted"
            },
        repertoire-assignment = profile-argument-r1
    }
},
type-of-delivery-control = "simple-delivery-control."

```

8.2.4 Profile Arguments

- r1 - is optional and enables negotiation of a value for the VTE-parameter repertoire-assignment for the two display objects (which always have the same value of repertoire assignment when the profile is called). The default value of this argument is the "Virtual Terminal Transparent Set" registered in the International Register under ISO 2375 register value 125, invoked by the escape sequence <ESC> 2/5 2/15 4/2. This argument is identified by the identifier for repertoire-assignment for display object D1.

8.2.5 Profile dependent Control Object Information

This profile does not reference any Control Objects.

8.2.6 Profile Notes

1. This profile is intended primarily for applications requiring a simultaneous two way exchange of sequences of uninterpreted characters. The semantics usually associated with the display object are not used; for the purposes of this profile, the primary attributes of the character-box graphic elements are actually octets which are passed directly to the real device. There is no relationship between the elements of the X-array and the character boxes of the real device; the secondary attributes of the display object are not utilized. The only operation on the display object which must be supported is the text operation. An alternative repertoire may be selected.

8.2.7 Specific Conformance Requirements

Support for the default (transparent) character set is required. It is strongly recommended that the profile argument not be used.

8.3 Forms Profile

OIW VTE-Profile Forms-1989 (r1,r2, . . . r28)

8.3.1 Introduction

This S-mode VTE-profile is intended for supporting the use of forms based, field oriented data entry applications between a terminal and a host system.

It provides facilities for:

- a) defining and using screen forms;
- b) defining field validation and field entry rules;

- c) controlling and validating field entry.

This VTE-profile includes support of an optional terminal-end locally attached printer.

8.3.2 Association Requirements

8.3.2.1 Functional Units

The following VT functional units are required for operation with this profile:

- a) Enhanced access-rules;
- b) Structured COs;
- c) Fields;
- d) Reference Information Objects.

The following VT functional units are optional for operation with this profile:

Urgent Data

8.3.2.2 Mode

This is an S-mode profile.

8.3.3 Profile Body

Display-objects *(single occurrence)* =

```
{
  display-object-name = A,
  DO-access           = "WAVAR",
  dimensions          = "three",
  x-dimension         =
    {
      x-bound          = profile-argument-r1,
      x-addressing      = "no constraint",
      x-absolute        = "yes",
      x-window          = x-bound
    },
  y-dimension         =
    {
      y-bound          = profile-argument-r2,
```

```

        y-addressing      = "no constraint",
        y-absolute        = "yes",
        y-window          = y-bound
    },
    z-dimension =
    {
        z-bound          = "unbounded",
        z-addressing      = "no constraint",
        z-absolute        = "no",
        z-window          = profile-argument-r3
    },
    erasure-capability = "yes",
    repertoire-capability *(implicitly defined by r4)*,
    repertoire-assignment = profile-argument-r4,

    font-capability *(implicitly defined by r5)*,
    font-assignment = profile-argument-r5,
    DO-emphasis = profile-argument-r6,

    foreground-colour-capability = profile-argument-r7,
    foreground-colour-assignment = profile-argument-r8,
    background-colour-capability = profile-argument-r7,
    background-colour-assignment = profile-argument-r9,

    block-definition-capability = "no",
    field-definition-capability = "yes",
    max-fields = "unbounded",
    max-field-elements = profile-argument-r10,
    access-outside-fields = profile-argument-r11
},

```

Control-objects =

```

{
    { *(Field Definition CO)*
        CO-name          = FD,
        CO-type-identifier = vt-b-sco-fdco,
        CO-structure      = "non-parametric",
        CO-access         = "WAVAR" + profile-argument-r12,
        CO-priority       = "normal",
        CO-trigger        = "not-selected"
    },

    { *(Field Entry Instructions CO)*
        CO-name          = EI,
        CO-type-identifier = "mandatory-feico",
        CO-structure      = "non-parametric",
    }
}

```

```

CO-access          = "WAVAR" + profile-argument-r12,
CO-priority        = "normal",
CO-trigger         = "not-selected"
},

```

```

{ *(Field Entry Pilot CO)*

```

```

CO-name            = EP,
CO-type-identifier = "mandatory-fepco",
CO-structure       = "non-parametric",
CO-access          = "WAVAR" + profile-argument-r12,
CO-priority        = "normal",
CO-trigger         = "not-selected"
},

```

```

{ *(Context CO)*

```

```

CO-name            = CC,
CO-type-identifier = vt-b-sco-cco,
CO-structure       = 6,
CO-access          = "WAVAR",
CO-priority        = "normal",
CO-trigger         = "not-selected"
},

```

```

{ *(Transmission Policy CO)*

```

```

CO-name            = TP,
CO-type-identifier = vt-b-sco-tpco,
CO-structure       = 1,
CO-access          = "WAVAR" + profile-argument-r12,
CO-priority        = "normal",
CO-trigger         = "not-selected",
CO-category       = "boolean",
CO-size           = 4
},

```

{ *(Multiple occurrence of optional COs. All unspecified VTE-parameters of such COs are determined by their CO-type-identifier through their registered definition. They may include parameters specified to be additional profile arguments, which should follow the appropriate CO-type-identifier argument value)*

```

CO-name            = profile-argument-r13,
CO-type-identifier = profile-argument-r14
},

```

```

{ *(Form Waiting Time CO)*

```

```

CO-name            = WT,
CO-type-identifier = "waiting-time",
CO-structure       = 1,

```



```

CO-access      = "WAVAR",
CO-priority    = "normal",
CO-trigger     = "not-selected",
CO-category    = "integer",
CO-size        = 65535
},

```

(The initial value for WT is zero, implying that a Form Waiting Time is not to be used.)

(The following four COs, (SA, UA, ST, and UT), are registered with the OIW registration authority and are referenced by this profile.)

```

{ *(As defined in clause 7)*
CO-name        = SA,
CO-type-identifier = oiw-vt-co-misc-sa,
CO-structure    = 1,
CO-access      = "WAVAR" + profile-argument-r12,
CO-priority    = "normal",
CO-trigger     = "not-selected",
CO-category    = "symbolic",
CO-size        = 11
},

```

```

{ *(As defined in clause 7)*
CO-name        = UA,
CO-type-identifier = oiw-vt-co-misc-ua,
CO-structure    = 1,
CO-access      = profile-argument-r12,
CO-priority    = "urgent",
CO-trigger     = "not-selected",
CO-category    = "symbolic",
CO-size        = 11
},

```

```

{ *(As defined in clause 7)*
CO-name        = ST,
CO-type-identifier = oiw-vt-co-misc-st,
CO-structure    = 1,
CO-access      = "WAVAR" + opposite of profile-argument-r12,
CO-priority    = "normal",
CO-trigger     = "not-selected",
CO-category    = "integer",
CO-size        = 65535
},

```

```

{ *(As defined in clause 7)*

```

```

CO-name           = UT,
CO-type-identifier = oiw-vt-co-misc-ut,
CO-structure      = 1,
CO-access        = opposite of profile-argument-r12,
CO-priority       = "urgent",
CO-trigger        = "not-selected",
CO-category       = "integer",
CO-size          = 65535
}
},

```

Device-objects *(single or double occurrence)* =

```

{
{
device-name = D,
device-default-CO-access = "WAVAR",
device-default-CO-priority = "normal",
device-default-CO-trigger = "not-selected",
device-default-CO-initial-value = 1."true",
device-repertoire-assignment = profile-argument-r15,
device-font-assignment = profile-argument-r16,
device-emphasis = profile-argument-r17,
device-foreground-colour-assignment = profile-argument-r18,
device-background-colour-assignment = profile-argument-r19,
device-minimum-X-array-length = profile-argument-r20,
device-minimum-Y-array-length = profile-argument-r21,
device-control-object = FD,
device-control-object = CC,
device-control-object = SA,
device-control-object = UA,
device-control-object = ST,
device-control-object = UT,
device-control-object = WT,
device-control-object = TP,
device-control-object = profile-argument-r22,
device-display-object = A
},

```

IF r23 = "true" THEN *(define printer)*

```

{
device-name = P,
device-default-CO-access = "NSAC",
device-default-CO-priority = "high",
device-default-CO-trigger = "not-selected",
device-default-CO-initial-value = 1."false",
device-repertoire-assignment = profile-argument-r24,

```

```
device-font-assignment = profile-argument-r25,  
device-emphasis = profile-argument-r26,  
device-foreground-colour-assignment = profile-argument-r27,  
device-background-colour-assignment = profile-argument-r28,  
device-minimum-X-array-length = profile-argument-r29,  
device-minimum-Y-array-length = profile-argument-r30,  
device-control-object = FD,  
device-control-object = SA,  
device-control-object = UA,  
device-control-object = profile-argument-r31,  
device-display-object = A  
}  
,
```

type-of-delivery-control = "simple delivery control."

8.3.4 FIXED Field Entry Instruction Definitions - non-parametric

8.3.4.1 Optional Field

Field entry is optional. This FEI is provided for completeness only, as a field not linked to one of the Mandatory field, Selectable field or Protected field FEIs is necessarily optional. This FEI can never be violated.

8.3.4.2 Mandatory Field

Field entry is mandatory. Violation of this FEI will occur if all array elements of this field are empty when one of the reactions FER01 (Transmit updates) or FER02 (Relinquish WAVAR) is initiated. See also the specification of these reactions given below.

8.3.4.3 Protected Field

The field is protected from field entry. Violation of this FEI will occur if an attempt is made to change the primary or secondary attribute of any array element of this field.

8.3.4.4 Fill Field

All array elements $k = 1$ through $k = \text{last}$ must have a primary attribute. Violation of this FEI will occur if any

array element of this field is empty when one of the reactions FER01 (Transmit updates) or FER02 (Relinquish WAVAR) is initiated. See also the specification of these reactions given below.

8.3.4.5 Echo Received Character

Allowed field entry characters are to be echoed as received. This FEI is provided for completeness only, as by default characters will be echoed as received unless the field is linked to either the Echo Off or the Echo Specified Character FEI. This FEI can never be violated.

8.3.4.6 Echo Off

Received field entry characters should not be echoed. This FEI can never be violated.

8.3.4.7 Ignore Case

If this FEI is linked to a field, upper and lower case alphabetic characters should be considered as equivalent during the validation of field input against all other FEIs linked to the same field. This affects the interpretation of the Allowed First Characters, Allowed Characters, Disallowed Characters and Allowed String Values FEIs, including the precedence rules between the first three of these FEIs. This FEI can never be violated.

8.3.4.8 Inhibit Logical Rendition Attribute Operation

No form of logical attribute operation, with the exception of character repertoire switching as given below, can be performed on the field. Character repertoire changes are permitted if also permitted by Allowed First Characters or Allowed Characters, see below. This FEI is intended to be used when the rendition secondary attributes are to be kept under "application" control. See, for example, Allowed First Characters for a case of reference to the field modal values.

8.3.5 DYNAMIC Field Entry Instruction Definitions - parametric

8.3.5.1 Selectable field

The field is selectable, i.e., field entry is not permitted but information is conveyed by the selection of one such field from a number of alternatives.

The manner in which the field that is the current candidate for selection is displayed on the real device is determined by the optional "visit" parameter of this FEI. This parameter specifies the secondary attributes to be used for showing or highlighting this candidate to the user. If it is omitted, an implementation-dependent default is used.

The manner in which the field that is actually selected is displayed on the real device is determined by the optional "select" parameter of this FEI. This parameter specifies the secondary attributes to be used for showing or highlighting the selected field to the user. If it is omitted, an implementation-dependent default is used.

The mechanisms for moving among candidates and for actually selecting the current candidate are implementation defined. Typically, a selectable field will be considered as a candidate for selection when the cursor is placed on a character within the selectable field. Actual selection generates the Field Selected FEE. A selected field is indicated in a delivered update by an addressing operation setting k=1 and f and z to indicate the selected field. These values will be reported to the host in the CCO if WAVAR is relinquished in reaction to this FEE. Violation of this FEI will occur if an attempt is made to change the primary or secondary attribute of any array element of this field.

8.3.5.2 Echo Specified Character

Specifies the character which is to be echoed to the user in response to each allowed character entered into the field. The secondary attributes of the echoed character may be specified. Any secondary attribute that is not given an explicit value in the FEI takes a default value in accordance with Definitive Note 4. This FEI can never be violated.

8.3.5.3 Minimum Entry

All array elements k=1 through k=Minimum Entry must have a primary attribute. If Minimum Entry exceeds field size, then all positions in the field must be filled. Violation of this FEI will occur if any of the specified array elements are empty when one of the reactions FER01 (Transmit updates) or FER02 (Relinquish WAVAR) is initiated. See also the specification of these reactions given below. When a field is associated with both the Optional Field FEI and a Minimum Entry FEI, the field is optional but if entry is elected, the number of characters specified by the Minimum Entry FEI must then be entered.

8.3.5.4 Allowed First Characters

Specifies a set of allowed characters for the first character position of the field. Either primary attributes alone or both primary and secondary attributes may be checked; see Definitive Note 3.

8.3.5.5 Allowed Characters

Specifies a set of allowed characters for all character positions within the field. Either primary attributes alone or both primary and secondary attributes may be checked; see Definitive Note 3. If Allowed First Characters and Allowed Characters are both specified for a particular field, then the set of Allowed First Characters applies to the first character position of the field and the set of Allowed Characters applies to the second through last character positions of the field.

8.3.5.6 Disallowed Characters

Specifies a set of disallowed characters for all character positions within a field. Either primary attributes alone or both primary and secondary attributes may be checked; see Definitive Note 3. If Allowed First Characters and Disallowed Characters are both specified for a particular field, then the set of Allowed First Characters applies to the first character position of the field and the set of Disallowed Characters applies to the second through last character positions of the field. When a field is associated with Allowed Characters FEI(s) and Disallowed Characters FEI(s) that have characters in common, the common characters are considered as disallowed.

8.3.5.7 Entry Invoke Character

Specifies the attributes to be used for showing or highlighting to the user where the next character entry is to be made. Both primary and secondary attributes, or secondary attributes alone, may be specified to over-ride the corresponding values present in the array element concerned. Any secondary attribute that is not given an explicit value in the FEI takes a default value in accordance with Definitive Note 4. Fields that are not linked to an Entry Invoke Character FEI, utilize a device dependent entry invoke character which may or may not be represented in the character repertoire negotiated for the device. This FEI can never be violated.

8.3.5.8 Waiting Time

Specifies the number of seconds to wait for field entry to complete after the cursor has been positioned within the field. Fields that are not associated with a Waiting Time FEI are not subject to the "Field Waiting Time Expired" Field Entry Event. Note that an overall waiting time for an entire form may be set by use of the "waiting-time" control object defined in Definitive Note 1. This FEI can never be violated.

8.3.5.9 Allowed String Values

Specifies a list of strings which identify valid field values. The strings are specified as either a discrete OCTET STRING or a range of OCTET STRING, or combination of both.

Ranges are specified using a lower "value" OCTET STRING and a higher "value" OCTET STRING. The "value" of an OCTET STRING is the integer value derived from the collating sequence corresponding to the repertoire explicitly or implicitly specified for the OCTET STRING. For example, the ISO 646 string 'AB' has the integer value 4142(16) and the string 'ABC' has the value 414243(16).

When strings of unequal length are compared, the smaller string is filled on the right with enough spaces to make the strings of equal length. The comparison of ISO 646 strings 'AB' and 'ABC' would be accomplished by first converting the string 'AB' to 'AB ' thus creating the value 414220(16) to be compared against the value 414243(16). The value of the space character is derived from the collating sequence corresponding to the repertoire identified in the field modal attributes. If this repertoire does not contain a space, then the value 20(16) is used.

Either primary attributes alone or both primary and secondary attributes may be checked; see Definitive Note

3. A single set of secondary attribute values may be specified for each individual OCTET STRING or range of OCTET STRINGs.

8.3.5.10 Allowed Numeric Values

Specifies a list of numeric strings which identify valid field values. The strings are specified as either a discrete OCTET STRING or a range of OCTET STRING, or a combination of both.

Ranges are specified using a lower "value" OCTET STRING and a higher "value" OCTET STRING. The "value" of an OCTET STRING is the integer value derived from the collating sequence corresponding to the repertoire explicitly or implicitly specified for the OCTET STRING. For example, the ISO 646 string '12' has the integer value 3132(16) and the string '123' has the integer value 313233(16).

When strings of unequal length are compared, the smaller string is filled on the left with enough zero characters to make the strings of equal length. The comparison of ISO 646 strings '12' and '123' would be accomplished by first converting the string '12' to '012' thus creating the value 303132(16) to be compared against the value 313233(16). The value of the zero character is derived from the collating sequence corresponding to the repertoire identified in the field modal attributes. If this repertoire does not contain a zero, then the value 30(16) is used.

Either primary attributes alone or both primary and secondary attributes may be checked; see Definitive Note 3. A single set of secondary attribute values may be specified for each individual OCTET STRING or range of OCTET STRINGs.

8.3.6 Mutually Exclusive FEIs

Some FEIs specify field entry validation rules that are in conflict with the rules specified by other FEIs. For example, a particular field cannot be both "protected" and "mandatory." Such conflicting FEIs cannot be associated with the same field. Table 9 defines the sets of conflicting FEIs.

Table 9 - Sets of conflicting FEIs

FEI	Conflicting FEIs
Optional Field	Mandatory Field, Selectable Field, Protected Field
Mandatory Field	Optional Field, Selectable Field, Protected Field
Selectable Field	All except Entry Invoke Character and Waiting Time
Protected Field	All
Fill Field	Selectable Field, Protected Field, Allowed String Values, Allowed Numeric Values
Echo Received Character	Selectable Field, Protected Field, Echo Off, Echo Specified Character
Echo Off	Selectable Field, Protected Field, Echo Received Character, Echo Specified Character
Ignore Case	Selectable Field, Protected Field
Inhibit Logical Rendition Attribute Operation	Selectable Field, Protected Field
Echo Specified Character	Selectable Field, Protected Field, Echo Off, Echo Received Character
Minimum Entry	Selectable Field, Protected Field
Allowed First Characters	Selectable Field, Protected Field, Allowed String Values, Allowed Numeric Values
Allowed Characters	Selectable Field, Protected Field, Allowed String Values, Allowed Numeric Values
Disallowed Characters	Selectable Field, Protected Field, Allowed String Values, Allowed Numeric Values
Entry Invoke Character	Protected Field
Waiting Time	Protected Field
Allowed String Values	Selectable Field, Protected Field, Fill Field, Allowed First Characters, Allowed Characters, Disallowed Characters, Allowed Numeric Values
Allowed Numeric Values	Selectable Field, Protected Field, Fill Field, Allowed First Characters, Allowed Characters, Disallowed Characters, Allowed String Values

8.3.7 FEICO Update Syntax

In the following syntax, ASN.1 Value Assignments have been used to attach value references to values of type NULL. This enables the values to be referenced by these names alone, without the need to follow the identifier explicitly with the value NULL.

FEI DEFINITIONS ::= BEGIN

```

FEI ::= CHOICE {
    fei0          [0]    IMPLICIT NULL,
    fei1          [1]    IMPLICIT NULL,
    fei2          [2]    IMPLICIT NULL,
    fei3          [3]    IMPLICIT NULL,
    fei4          [4]    IMPLICIT NULL,
    fei5          [5]    IMPLICIT NULL,
    fei6          [6]    IMPLICIT NULL,
    fei7          [7]    IMPLICIT NULL,
    selectableField [8]    IMPLICIT SEQUENCE {
        visit    [0] IMPLICIT SecAttributes OPTIONAL,
        select   [1] IMPLICIT SecAttributes OPTIONAL },
    echoSpecifiedCharacter [9]    IMPLICIT Character,
    minimumEntries [10]   IMPLICIT INTEGER,
    allowedFirstCharacters [11]   IMPLICIT CharacterValues,
    allowedCharacters [12]   IMPLICIT CharacterValues,
    disallowedCharacters [13]   IMPLICIT CharacterValues,
    entryInvokeCharacter [14]   CHOICE {
        [0] IMPLICIT Character,
        [1] IMPLICIT SecAttributes },
    waitingTime [15]    IMPLICIT INTEGER,
    allowedStringValue [16] IMPLICIT CharacterValues,
    allowedNumericValues [17] IMPLICIT CharacterValues }

optionalField      FEI ::= fei0 NULL
mandatoryField     FEI ::= fei1 NULL
protectedField     FEI ::= fei2 NULL
fillField          FEI ::= fei3 NULL
echoReceivedChar   FEI ::= fei4 NULL
echoOff            FEI ::= fei5 NULL
ignoreCase         FEI ::= fei6 NULL
inhibitLogRendAttOp FEI ::= fei7 NULL

```

```

Character ::= SEQUENCE {
    primaryValue [0]    IMPLICIT PriValue,
    attributes   [1]    IMPLICIT SecAttributes OPTIONAL }
-- When used as one element of a comparison, secondary
-- attributes are to be compared only if the attributes

```

-- element is present.

```
CharacterValues ::= SEQUENCE OF SEQUENCE {
    lowValue          [0]    IMPLICIT Character,
    highValue         [1]    IMPLICIT PriValue OPTIONAL }
-- The default for highValue is the associated
-- lowValue. Octet values specified for highValue
-- are constrained by the repertoire corresponding
-- to the lowValue value. The relationship
-- [lowValue <= highValue] must be true.
```

```
PriValue ::= OCTET STRING
-- The octet string comprising a value of the PriValue
-- type is constrained to the encoding of a sequence
-- of characters from the repertoires negotiated for
-- the associated Display Object. When used in the
-- ASN.1 module FEI, the octet string is restricted to
-- the encoding of a single character except for its
-- use in allowedStringValue and allowedNumeric-
-- Values.
```

```
SecAttributes ::= SEQUENCE {
    repertoire        [0]    IMPLICIT INTEGER OPTIONAL,
    foregroundColour  [1]    IMPLICIT INTEGER OPTIONAL,
    backgroundColour  [2]    IMPLICIT INTEGER OPTIONAL,
    emphasis          [3]    IMPLICIT PrintableString OPTIONAL,
    font              [4]    IMPLICIT INTEGER OPTIONAL }
```

END *(FEI DEFINITIONS)*

8.3.8 FEICO "mandatory-feico" Initial Content

For each FEIRxx, xx identifies the integer value to be used as "feirList recordIndex" in FDCOUpdate operations. FEICOUpdate operations must use an "index" greater than 127. Note that the character oriented FEIRs for the initial FEICO utilize the default secondary attributes, and that the Selectable Field FEI uses implementation-dependent defaults for the 'visit' and 'select' secondary attributes. The FEIR contents are specified in terms of ASN.1 Value Notation appropriate to the FEICO Update Syntax specified above.

Table 10 - FEICO "mandatory-feico" Initial Content

FEIR	Value
FEIR00	-- not used --
FEIR01	optionalField
FEIR02	mandatoryField
FEIR03	selectableField { }

FEIR04	protectedField
FEIR05	fillField
FEIR06	echoReceivedCharacter
FEIR07	echoOff
FEIR08	ignoreCase
FEIR09	inhibitLogRendAttOp
FEIR10	allowedCharacters {{ lowValue {'41'H}, highValue '5A'H }} -- A,B,...,Z --
FEIR11	allowedCharacters {{ lowValue {'61'H}, highValue '7A'H }} -- a,b,...,z --
FEIR12	allowedCharacters {{ lowValue {'30'H}, highValue '39'H }} -- 0,1,...,9 --
FEIR13	disallowedCharacters {{ lowValue {'41'H}, highValue '5A'H }} -- A,B,...,Z --
FEIR14	disallowedCharacters {{ lowValue {'61'H}, highValue '7A'H }} -- a,b,...,z --
FEIR15	disallowedCharacters {{ lowValue {'30'H}, highValue '39'H }} -- 0,1,...,9 --
FEIR16-FEIR127	-- These values are reserved --

8.3.9 Field Entry Event Definitions

The Field Entry Events for the mandatory FEPCO are defined in the following subclauses. A parameter of type "Range" is a sequence of integer pairs, each with an optional bitmask. Each pair gives the end points of an interval of integer values. An integer value lies within the range specified if, after applying the bitmask (if given) to its binary form, it lies in any of these intervals. The end points of an interval are included in the values of that interval.

It is permissible for the ranges specified by the FEEs referenced in the entry control FEPR-list of a field to overlap. When an event occurs which is referenced in this way by more than one FEPR linked to the current field, the FEPR invoked is the first FEPR in the FEPR-list which both references the event and for which the Field Entry Conditions are satisfied.

8.3.9.1 FEE00

Not used.

8.3.9.2 FEE01 Logical Keystroke event (Range)

This event takes a range of integers as a parameter, and occurs when a Logical Keystroke occurs within the specified range. The Logical Keystroke is either initiated by the Logical Keystroke FER or by the human user, see Definitive Note 8.

8.3.9.3 FEE02 Field entry complete

This event is generated by entry of a character into the last position in a field. It need not imply that all character positions in the field have been entered, since these positions are not necessarily written sequentially. Local cursor movements, for example, may be used during local editing to move the current entry position around the screen.

8.3.9.4 FEE03 Field selected

This event is generated by the selection of a field that is linked to the Selectable Field FEI. The means by which the current candidate for selection is actually selected is implementation dependent.

8.3.9.5 FEE04 Field Waiting Time expired

The field waiting time specified by the Waiting Time FEI linked to the current field has been exceeded. Fields not linked to such an FEI are not subject to this event.

8.3.9.6 FEE05 Field Entry Instruction violation

Some of the defined FEIs imply Field Entry Validation by the terminal VT-user. Fields linked to such FEIs are candidates for erroneous field entry. This event is generated when such a violation occurs, thus enabling linkage to Field Entry Reactions that may signal a visual or audible indication of such a violation, or alternatively may terminate local entry and relinquish WAVAR. A Violation FEC is available to allow different reactions according to which FEIR is violated. When the reaction is to relinquish WAVAR, the Entry-control index and FEPR index elements of the Context Control Object will inform the host which FEPR caused the return. If this FEPR has made use of the Violation FEC, this FEC will identify to the host that the violated FEIR was one of those in the list that forms the parameter value for the FEC. Unique identification of the FEIR is obtained if this list contains only one FEIR. The host can then take whatever action is appropriate to the FEIR or FEIRs so identified.

8.3.10 Field Entry Condition Definitions

The elementary Field Entry Conditions for the mandatory FEPCO are defined below. Composite conditions can be built by use of the specified parameters, and an individual FEPR can include multiple conditions in accordance with 20.3.5.2 of ISO 9040.

A parameter of type Action is specified either as an explicit integer value or as the current keystroke, see Definitive Note 8. Such a parameter evaluates to an integer of the type STCO.Key defined in clause 7.3.7. That clause also defines names of logical keystrokes associated with these integers. The local actions associated with such values are defined in Definitive Note 9.

8.3.10.1 FEC00

Not used.

8.3.10.2 FEC01 No previous field

The current field has no currently defined previous field, in the sense of 20.3.3.4 of ISO 9040.

8.3.10.3 FEC02 No next field

The current field has no currently defined next field, in the sense of 20.3.3.4 of ISO 9040.

8.3.10.4 FEC03 Start of field

The current location for the next character entry is at the first location in the current field.

8.3.10.5 FEC04 End of field

The current location for the next character entry is at the last location in the current field.

8.3.10.6 FEC05 At tab stop

The current location for the next character entry is at a tabulation stop defined by the optional Horizontal Tabulation CO {ewos-vt-co-misc-ht} registered with the EWOS Registration Authority. If this CO is not present in the VTE, this condition is deemed to be always satisfied.

8.3.10.7 FEC06 At characters (Set of character values)

The current location for the next character entry is at an array element whose current value is one of the specified characters. The set of characters is specified and interpreted in accordance with Definitive Note 3.

8.3.10.8 FEC07 Exits field (Action)

The local action designated by the parameter value would move the location for the next character entry out of the current field.

8.3.10.9 FEC08 Exits forward path (Action)

The local action designated by the parameter value would move the location for the next character entry out of the forward navigation path starting at the current field.

8.3.10.10 FEC09 Exits backward path (Action)

The local action designated by the parameter value would move the location for the next character entry out of the backward navigation path starting at the current field.

8.3.10.11 FEC10 Exits x-array (Action)

The local action designated by the parameter value would move the location for the next character entry out of the current x-array.

8.3.10.12 FEC11 Exits y-array (Action)

The local action designated by the parameter value would move the location for the next character entry out of the current y-array.

8.3.10.13 FEC12 Not FEC (FEC)

This condition is satisfied precisely when the FEC given as its parameter is not satisfied.

8.3.10.14 FEC13 And FECs (Set of FEC)

This condition is satisfied when each of the conditions in the set comprising its parameter is satisfied.

8.3.10.15 FEC14 Or FECs (Set of FEC)

This condition is satisfied when at least one of the conditions in the set comprising its parameter is satisfied.

8.3.10.16 FEC15 Violation (Set of FEIR Identifiers)

This condition is provided for use in conjunction with the Field Entry Instruction Violation FEE. Its parameter is an FEIR-list specified as a set of FEIR identifiers. Each identifier is a pair <FEICO-name, index> where index is an integer addressing a record in the FEICO whose name is specified. This FEC is satisfied if the FEIR whose violation generated this event is one of the FEIRs in this FEIR-list. If it is used in conjunction with any other FEE then this condition is true.

8.3.10.17 FEC16 Unconditional

This condition is always true. It is given for completeness only, and has the same effect as an empty set of conditions in an FEPR.

8.3.11 Field Entry Reaction Definitions

The Field Entry Reactions for the mandatory FEPCO are defined below. The significance of a parameter of type "Action" is as described for Field Entry Conditions. A parameter of type "ResetAttribute" may take either of the two values "reset" and "noReset." Such a parameter controls the effect of an erase operation on the secondary attributes of the erased elements, corresponding to the values "yes" and "no" for the reset-attribute parameter of a LOGICAL-ERASE operation as defined in 19.2.3.5 of ISO 9040.

8.3.11.1 FER00

Not used.

8.3.11.2 FER01 Transmit updates

The host copy of the CCA is updated to correspond to the terminal copy by the transmission of all undelivered update operations. The operations required to update field contents are controlled by the T-policy component of the Field Definition Record for the fields concerned. However, if this FER generates an FEI violation in accordance with the specifications of the FEICO(s) present in the VTE, and if the current field is also linked to an FEPR with event FEE05 (FEI violation) and satisfied conditions, then this FER is not performed and that FEPR is activated; the original FEPR is abandoned.

8.3.11.3 FER02 Relinquish WAVAR

The action described under Transmit Updates is performed, followed by return of the WAVAR access right to the host. However, if this FER generates an FEI violation in accordance with the specifications of the FEICO(s) present in the VTE, and if the current field is also linked to an FEPR with event FEE05 (FEI violation) and satisfied conditions, then this FER is not performed and that FEPR is activated; the original FEPR is abandoned.

8.3.11.4 FER03 Erase field right (Reset attribute)

The primary attribute value is cancelled for all elements of the current field from the current character entry location to the end of the field. The effect on the secondary attribute values is determined by the reset-attribute parameter as described above.

8.3.11.5 FER04 Erase path right (Reset attribute)

The primary attribute value is cancelled for all elements of all unprotected fields in the forward navigation path containing the current field, from the current character entry location onwards. Note that the forward navigation path may not terminate, as its definition in 20.3.3.4 of ISO 9040 does not prohibit looping. When a loop is entered during this operation, the operation terminates when all elements of the entered loop have been erased. The effect of this operation on the secondary attribute values is determined by the reset-attribute parameter as described above.

8.3.11.6 FER05 Local action (Action)

That local action is performed which is designated by the given parameter value. The specification of these local actions is given in Definitive Note 9.

8.3.11.7 FER06 Logical Keystroke (Action)

Initiate the FEPR processing which would occur if the given keystroke had occurred. This may itself cause the Logical Keystroke FER and hence recursive processings of FERs. Processing of current FERs is suspended until this recursive processing is complete. During recursive processing, the current keystroke is taken as the argument to this FER. When the recursive processing is complete, the previous keystroke is restored and processing of current FERs is resumed.

8.3.11.8 FER07 Update ST CO (Action)

The integer value corresponding to the given parameter is written to the Sequenced Terminal CO. This FER will usually be followed by a Transmit Updates or Relinquish WAVAR FER to communicate the update to the application.

8.3.11.9 FER08 Update UT CO (Action)

The integer value corresponding to the given parameter is written to the Unsequenced Terminal CO. This update will be communicated to the application immediately.

8.3.11.10 FER09 Execute RIO record (RIO record id)

An EXECUTE-RECORD operation is performed on the RIO record specified in the parameter, in accordance with 22.4.1 of ISO 9040.

8.3.11.11 FER010 Call RIO record (RIO record id)

A CALL-RECORD operation is performed on the RIO record specified in the parameter, in accordance with 22.4.2 of ISO 9040.

8.3.11.12 FER11 Visual indication

Present a visual indication in response to Field Entry Instruction violations.

8.3.11.13 FER12 Audible indication

Present an audible indication in response to Field Entry Instruction violations.

8.3.11.14 FER13 Conditional branch

(if: FEC, then: Optional sequence of FER, else: Optional sequence of FER)

If the condition given by the "if" parameter is satisfied then perform the sequence of reactions given by the "then" parameter, else perform the sequence of reactions given by the "else" parameter.

8.3.11.15 FER14 Prevent further entry

It is recommended that if a type-ahead buffer is in use by the local user interface, this reaction should prevent further entry into the buffer. Attempted entry may then sound an alarm or be signalled by some other local means, but is not an FEI violation. If the WAVAR access right is relinquished without this reaction being invoked, the buffer may continue to accept entries. Entry into the buffer is resumed when WAVAR is next returned to the terminal. It is not a violation of this profile specification if the terminal VT-user does not behave in the intended manner.

8.3.11.16 FER15 Write disallowed character

The most recent disallowed character is written as if it were not disallowed. If there has been no disallowed character, the effect is null. This FER is used when it is desired to trap the entry of a particular character, not to forbid it but instead to generate some other reactions in addition to the character entry.

8.3.11.17 FER16 Write string (Character string)

The character string given as a parameter is written as LOGICAL TEXT to the current entry location without regard to FEICO control. If the end of the field is reached before the string has been written in its entirety, the reaction is terminated prematurely.

8.3.12 Field Entry Pilot Update Syntax

In the following syntax, ASN.1 Value Assignments have been used to attach value references to values of type NULL. This enables the values to be referenced by these names alone, without the need to follow the identifier explicitly with the value NULL.

FEPR DEFINITIONS ::= BEGIN

```
FEE ::= CHOICE {  
    logicalKeystroke    [1] IMPLICIT Range,  
    fee02               [2] IMPLICIT NULL,  
    fee03               [3] IMPLICIT NULL,  
    fee04               [4] IMPLICIT NULL,  
    fee05               [5] IMPLICIT NULL }  
  
fieldEntryComplete    FEE ::= fee02 NULL  
fieldSelected          FEE ::= fee03 NULL  
fieldWaitTimeExpired  FEE ::= fee04 NULL  
feiViolation           FEE ::= fee05 NULL
```

```

FEC ::= CHOICE {
    fec01          [1] IMPLICIT NULL,
    fec02          [2] IMPLICIT NULL,
    fec03          [3] IMPLICIT NULL,
    fec04          [4] IMPLICIT NULL,
    fec05          [5] IMPLICIT NULL,
    atChar         [6] IMPLICIT FEI.CharacterValues,
    exitsField     [7] Action,
    exitsForwardPath [8] Action,
    exitsBackwardPath [9] Action,
    exitsXarray    [10] Action,
    exitsYarray    [11] Action,
    not            [12] FEC,
    and            [13] IMPLICIT SET OF FEC,
    or             [14] IMPLICIT SET OF FEC,
    violation      [15] IMPLICIT SET OF SEQUENCE
                     { feicoName PrintableString,
                       recordIndex INTEGER },
    fec16          [16] IMPLICIT NULL }

noPreviousField  FEC ::= fec01 NULL
noNextField      FEC ::= fec02 NULL
startField       FEC ::= fec03 NULL
endField         FEC ::= fec04 NULL
atTab            FEC ::= fec05 NULL
unconditional    FEC ::= fec16 NULL

```

```

FER ::= CHOICE {
    fer01          [1] IMPLICIT NULL,
    fer02          [2] IMPLICIT NULL,
    eraseFieldRight [3] IMPLICIT ResetAttribute,
    erasePathRight  [4] IMPLICIT ResetAttribute,
    local          [5] Action,
    logicalKeystroke [6] Action,
    updateSTCO      [7] Action,
    updateUTCO      [8] Action,
    executeRIO      [9] IMPLICIT RIORecordID,
    callRIO         [10] IMPLICIT RIORecordID,
    fer11           [11] IMPLICIT NULL,
    fer12           [12] IMPLICIT NULL,
    branch          [13] IMPLICIT SEQUENCE {
        if         [1] FEC,
        then       [2] IMPLICIT SEQUENCE OF FER OPTIONAL,
        else       [3] IMPLICIT SEQUENCE OF FER OPTIONAL },
    fer14          [14] IMPLICIT NULL,
    fer15          [15] IMPLICIT NULL,
    writeString    [16] IMPLICIT SEQUENCE OF
                    FEI.Character
    -- The string written by this FER is the
    -- concatenation of the strings specified by
    -- the individual FEI.Character values. -- }

```

```

transmitUpdates    FER ::= fer01 NULL
relinquishWAVAR    FER ::= fer02 NULL
visualIndication   FER ::= fer11 NULL
audibleIndication  FER ::= fer12 NULL
preventFurtherEntry FER ::= fer14 NULL
writeDisallowedChar FER ::= fer15 NULL

```

```

RIORecordID ::= SEQUENCE {
    rioName      [1] IMPLICIT PrintableString OPTIONAL,
    -- optional if there is only 1 RIO in the VTE
    recordID     [2] IMPLICIT PrintableString }

```

```

Range ::= SEQUENCE OF SEQUENCE {
    [1] IMPLICIT STCO.Key,
    [2] IMPLICIT STCO.Key OPTIONAL,
    mask          [3] IMPLICIT BIT STRING OPTIONAL }
    -- The first two values of each trio represent an
    -- interval of logical keystroke values. The second
    -- value in each pair shall not be smaller than the

```



```
-- first value. If the second value is omitted, the
-- interval contains only the specified first value.
-- If the optional mask is given, then the value being
-- tested is bitwise logically ANDed with the mask
-- before being compared with the end points of the
-- interval.
```

```
ResetAttribute ::= BOOLEAN
```

```
reset           ResetAttribute ::= TRUE
noReset         ResetAttribute ::= FALSE
```

```
Action ::= CHOICE {
    current      [1] IMPLICIT STCO.Key,
                [2] IMPLICIT NULL }
```

```
currentKeystroke Action ::= current NULL
```

```
-- The ASN.1 module STCO is defined in the specification of
-- the Sequenced Terminal CO in clause 7.3. STCO.Key is
-- an integer type with a named number list, each named
-- number representing a specific logical keystroke as
-- defined for that CO.
```

```
END *(FEPR DEFINITIONS)*
```

```
FEPCO "mandatory-fepco" Initial Content
```

For each FEPRxx, xx identifies the integer value to be used as "feprList recordIndex" in FDCOUpdate operations. FEPCOUpdate operations must use an "index" greater than 127. The FEPR contents are specified in terms of ASN.1 Value Notation appropriate to the FEPCO Update Syntax specified above. Note that "shiftTab" is a named integer of type STCO.Key. The local action it designates is defined in Definitive Note 9 to be movement of the current character entry position to the first location of the next field in the forward navigation path.

Table 11 - FEPCP "mandatory-fepco" Initial Content

FEPR No	Component	ASN.1 Description
FEPR00		--Not used--
FEPR01	FEE FEC FER01 FER02	logicalKeystroke { { 0, 65535 } } unconditional updateSTCO currentKeystroke relinquishWAVAR
FEPR02	FEE FEC FER	fieldEntryComplete noNextField relinquishWAVAR
FEPR03	FEE FEC FER	fieldEntryComplete not noNextField local shiftTab
FEPR04	FEE FEC FER	fieldSelected unconditional relinquishWAVAR
FEPR05	FEE FEC FER	fieldWaitTimeExpired noNextField relinquishWAVAR
FEPR06	FEE FEC FER	fieldWaitTimeExpired not noNextField local shiftTab
FEPR07	FEE FEC FER	feiViolation unconditional visualIndication
FEPR08	FEE FEC FER	feiViolation unconditional audibleIndication
FEPR09- FEPR127		-- Reserved --

8.3.13 Profile Arguments

- r1 - is optional and provides for the negotiation of a value for the VTE-parameter x-bound. It takes an integer value greater than zero. Default is 80.
- r2 - is optional and provides for the negotiation of a value for the VTE-parameter y-bound. It takes an integer value greater than zero. Default is 24.
- r3 - is optional and provides for the negotiation of a value for the VTE-parameter z-window. It takes an integer value greater than zero. Default is 1.
- r4 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter repertoire-assignment. The value for the VTE-parameter

repertoire-capability is implied by the number of occurrences of this profile argument. Default is a single occurrence with the value {value iso2022 {'2842'H}} of ASN.1 type CDS.RepertoireAssignment as defined in ISO 9041, designating the GL set ISO 2375 Reg. No. 6 (ASCII).

- r5 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter font-assignment. The font-assignment-type component of a font-assignment value is an ASN.1 OBJECT IDENTIFIER that designates a registered syntax and semantics for the font-assignment-value component. The value for the VTE-parameter font-capability is implied by the number of occurrences of this profile argument. If there are no explicit occurrences of this profile argument then the font-capability and font-assignment VTE-parameters take the default values specified in ISO 9040.
- r6 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter DO-emphasis. The syntax and semantics for this VTE-parameter are specified in Definitive Note 6, and for this profile argument are specified in B.17.4 of ISO 9040. The default value for the occurrence corresponding to each unspecified subattribute is the ASN.1 PrintableString of length 1 specifying the explicit modal default value for that subattribute.
- r7 - is optional and provides for the negotiation of a value for the VTE-parameters foreground-colour-capability and background-colour-capability. Default is 8. This argument is identified by the identifier for the VTE-parameter foreground-colour-capability for display object A.
- r8 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter foreground-colour-assignment. The default values for unspecified occurrences of this profile argument are the corresponding values from the ordered list {"white," "black," "red," "cyan," "blue," "yellow," "green," "magenta"}. There are no default values if the value of the VTE-parameter foreground-colour-capability exceeds 8.
- r9 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter background-colour-assignment. The default values for unspecified occurrences of this profile argument are the corresponding values from the ordered list {"black," "white," "cyan," "red," "yellow," "blue," "magenta," "green"}. There are no default values if the value of the VTE-parameter background-colour-capability exceeds 8.
- r10 - is optional and provides for the negotiation of a value for the VTE-parameter max-field-elements. Default is 1.
- r11 - is optional and provides for the negotiation of a value for the VTE-parameter access-outside-fields. Default is "not allowed."
- r12 - is mandatory and provides for the negotiation of a value for the VTE-parameter CO-access for the Field Definition, Field Entry Instruction, Field Entry Pilot, Transmission Policy, Sequenced Application, Unsequenced Application, Sequenced Terminal, and Unsequenced Terminal control objects. If the VT-association initiator is the terminal VT-user, it takes the value "WACA," otherwise it takes the value "WACL." This argument is identified by the identifier for CO-access for control object UA.

- r13 - is optional, may occur a number of times and provides for the negotiation of a value for the VTE-parameter CO-name for optional registered COs. By default no optional COs are invoked.
- r14 - is optional, may occur a number of times and provides for the negotiation of a value for the VTE-parameter CO-type-identifier for optional registered COs. The particular generic type concerned is determined from the CO-type-identifier by the register entry. The value vt-b-sco-nullrio selects an empty RIO. An occurrence of the previous argument specifies the presence of an optional CO in the VTE-profile. An occurrence of this argument is required for every occurrence of the previous argument. By default no optional COs are invoked.
- r15 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter device-repertoire-assignment for the main device. Default is "null" for each unspecified occurrence.
- r16 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter device-font-assignment for the main device. Default is "null" for each unspecified occurrence.
- r17 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter device-emphasis for the main device. The syntax and semantics for this VTE-parameter are specified in Definitive Note 6, and for this profile argument are specified in B.17.4 of ISO 9040. Default is "null" for each unspecified occurrence.
- r18 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter device-foreground-colour-assignment for the main device. Default is "null" for each unspecified occurrence.
- r19 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter device-background-colour-assignment for the main device. Default is "null" for each unspecified occurrence.
- r20 - is optional and provides for the negotiation of a value for the VTE-parameter device-minimum-X-array-length for the main device. It takes an integer value greater than zero. Default is the value of x-bound for the display object.
- r21 - is optional and provides for the negotiation of a value for the VTE-parameter device-minimum-Y-array-length for the main device. It takes an integer value greater than zero. Default is the value of y-bound for the display object.
- r22 - is optional, may occur a number of times and provides for the negotiation of additional values for the VTE-parameter device-control-object for the main device. By default there are no additional values.
- r23 - is a special profile argument identified by the special-profile-arg-ident "Pp-1." It is optional and provides for the negotiation of a printer device. Default is "false."
- r24 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter device-repertoire-assignment for the printer device. Default is "null"

for each unspecified occurrence.

- r25 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter device-font-assignment for the printer device. Default is "null" for each unspecified occurrence.
- r26 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter device-emphasis for the printer device. The syntax and semantics for this VTE-parameter are specified in Definitive Note 6, and for this profile argument are specified in B.17.4 of ISO 9040. Default is "null" for each unspecified occurrence.
- r27 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter device-foreground-colour-assignment for the printer device. Default is "black" for each unspecified occurrence.
- r28 - is optional, may occur a number of times in an ordered list and provides for the negotiation of a value(s) for the VTE-parameter device-background-colour-assignment for the printer device. Default is "white" for each unspecified occurrence.
- r29 - is optional and provides for the negotiation of a value for the VTE-parameter device-minimum-X-array-length for the printer device. It takes an integer value greater than zero. Default is the value of x-bound for the display object.
- r30 - is optional and provides for the negotiation of a value for the VTE-parameter device-minimum-Y-array-length for the printer device. It takes an integer value greater than zero. Default is the value of y-bound for the display object.
- r31 - is optional, may occur a number of times and provides for the negotiation of additional values for the VTE-parameter device-control-object for the printer device. By default there are no additional values.

8.3.14 Profile Dependent Control Objects

This profile uses the OIW registered Control Objects SA, UA, ST and UT. The profile defined values are specified in the body of this profile. The CO specifications require the usage of each CO to be specified in the profile. This is as follows.

8.3.14.1 Sequenced Application CO

This Control Object is defined in 7.1. It has CO-category "symbolic." Update of this CO with the value "audible_alarm" sounds an audible alarm in the terminal. Update with the value "visual_alarm" generates a visual indication of a signal from the application. All other values have no effect.

8.3.14.2 Unsequenced Application CO

This Control Object is defined in 7.2. It has CO-category "symbolic." Update of this CO with the value "audible_alarm" sounds an audible alarm in the terminal. Update with the value "visual_alarm" generates a visual indication of a signal from the application. All other values have no effect.

8.3.14.3 Sequenced Terminal CO

This Control Object is defined in 7.3. It has CO-category "integer." It is updated by the Update ST CO FER, and may be used to communicate uninterpreted keystrokes to the application.

8.3.14.4 Unsequenced Terminal CO

This Control Object is defined in 7.4. It has CO-category "integer." It is updated by the Update UT CO FER and is used to communicate uninterpreted keystrokes to the application urgently.

8.3.15 Profile Notes**8.3.15.1 Definitive Notes**

1. The WT control object provides a mechanism for the application VT-user to specify a time in which all the fields of a form must be completed. The terminal VT-user starts the timer at the time when it receives WAVAR. If the timer expires, further entry by the device is stopped, all undelivered updates are transmitted, and WAVAR is relinquished. The undelivered updates are transmitted followed by an update to this control object. The WT update is made using the current value of the WT control object. The device-control-object VTE-parameter is used to link this CO to the input device that it controls. The data element of this CO specifies the waiting time in seconds. A zero value signifies that a Form Waiting Time is not to be used. The initial value of this data element is zero.
2. If there are two or more Character-oriented FEIs of the same type associated with the same field, they are equivalent to a single FEI of that type whose parameter is the concatenation of the individual parameter values.
3. The following parameteric FEIs and FECs defined in clause 8.3.4 test equality of characters:

Allowed First Characters FEI
Allowed Characters FEI
Disallowed Characters FEI
Allowed String Values FEI
Allowed Numeric Values FEI
At Characters FEC

The characters for each such FEI or FEC are specified by a parameter that includes an optional set of secondary attributes. If this set is included, the test is on both primary and secondary attributes; otherwise it is on primary attributes only. If the test is on primary attributes only, then characters which pass the test are allowed, disallowed or accepted, as appropriate, irrespective of the values of their secondary attributes. The set of secondary attributes need not specify an explicit value for every secondary attribute; in particular the empty set is permissible. Default values are used for unspecified secondary attributes. These are determined in accordance with Definitive Note 4.

4. The parameter values for a number of FEIs, FECs and FERs require default values to be used for secondary attributes when such values are not specified explicitly by the parameter. The first choice default for each secondary attribute value is the field modal attribute value at the time that the FEI, FEC or FER is accessed. A first choice default value of "null" is resolved as specified in 19.2.3.1 of ISO 9040 for the LOGICAL-TEXT update operation.
5. When the Character oriented FEIs associated with a particular field have characters in common, the precedence algorithm given below is used.

The Allowed First Characters FEI takes precedence over the Allowed Characters and Disallowed Characters FEIs for field character position $k=1$. The Disallowed Characters FEI takes precedence over the Allowed Characters FEI for all field character positions.

The following example illustrates the conflict resolution algorithm. When a particular field is linked to the following three Character oriented FEIs:

Allowed First Characters	= a
Allowed Characters	= a,b
Disallowed Characters	= a

the field must be entered with the letter "a" in the first character position of the field. The remaining character positions in the field are limited to containing the letter "b." Therefore field entry would be limited to a form such as "abbbb. ..."

6. The following syntax and semantics is mandatory for the emphasis and device-emphasis VTE-parameters. The scheme of B.17.3 of ISO 9040 is to be adopted except that the maximum length for an ASN.1 PrintableString used as an emphasis value is increased from 6 characters to 8 characters. Values "B" (Boxed) and "C" (Encircled) are deleted from subattribute "b." Two further subattributes are added, denoted by "g" and "h." The table of allowed character values, ISO 6429 SET GRAPHIC RENDITION parameter values and associated semantics given in B.17.3 of ISO 9040 is augmented by the addition of:

Subattribute "g" values

= "I"	3	Italicized characters
= "U" *	23	Upright, not italicized characters
= " "	-	No change

Subattribute "h" values

= "F"	51	Framed
-------	----	--------

= "C"	52	Encircled
= "N" *	54	Not framed, not encircled
= " "	-	No change

As in B.17.3 of ISO 9040, * indicates the value which is the explicit modal default value for the subattribute. Not all the values of this scheme need to have a 1-1 correspondence with emphasis levels available on the real device. The device object defines the real mapping.

7. When default values are defined for a multiple-occurrence profile argument and fewer occurrences are negotiated than are required by the value of a parent VTE-parameter, the remaining occurrences still take the specified default values.
8. Every action corresponding to the operation of an object updating device shall be assigned a non-negative integer value. This value shall be interpreted as a logical keystroke in accordance with the definitions of the Sequenced Terminal CO and Unsequenced Terminal CO in 7.3 and 7.4.

Values in the range 0-255 are used to generate entry of characters into the Display Object from the available repertoires. Values greater than 255 generate the Logical Keystroke FEE and thus have effects that are under the control of the FEPCOs present in the VTE.

9. A minimum set of local actions is defined within this profile, but implementors may extend this as required. A host implementation thus may not know what local action is being over-ridden when it requests that a particular logical keystroke should be notified to the host. To prevent this from limiting the capabilities of the terminal, two keystroke combinations that differ only in the inclusion or otherwise of the ALT key are required to have the same potential local action. Host implementations are advised not to over-ride the action of both such keystrokes.

The defined minimum set of local actions concerns control of the current entry location. At any time when the terminal possesses the WAVAR access right, there is a well-defined Display Object array element which is the current candidate for update by a character entry operation, as described in Informative Note 4. If this element lies outside of any field, or within a protected field, update is prohibited unless the negotiated value of the VTE-parameter access-outside-fields is "yes," but the array element is still defined. Neither this location nor that of any cursors which the implementation may use to indicate such elements is recorded in the CCA. It is separate from the current position of either the display pointer or the logical pointer, and movement of this entry location is a purely local action.

Table 12 - Local actions that move entry location

Name	Unshifted Action	Shifted Action
leftArrow	$x = x-1$	$k = k-1$
rightArrow	$x = x+1$	$k = k+1$
upArrow	$y = y-1$	$f = f-1, k = 1$
downArrow	$y = y+1$	$f = f+1, k = 1$
home	$(x,y,z) = \text{"start-y"}$	$(k,f,z) = \text{"start-k"}$
end	$(x,y,z) = \text{"end-y"}$	$(k,f,z) = \text{"end-k"}$
pageUp	$z = z-1, x=1, y=1$	$z = z-1, f = 1, k = 1$
pageDown	$z = z+1, x=1, y=1$	$z = z+1, f = 1, k = 1$
tab		$f = \text{next}(f), k = 1$
backTab		$f = \text{previous}(f), k = 1$

The names given in the first column of Table 12 are the identifiers of named integers of type STCO.Key. The ASN.1 module STCO is defined as part of the specification of the Sequenced Terminal Control Object in 7.3. These identifiers or the corresponding integers are used to designate the local actions specified in the second column. If the initial lower case letter of such a name is converted to upper case and prefixed with "shift" then it designates the local action specified in the third column.

In this table, "=" is used as an assignment operator. The unshifted actions reference array elements by normal (x, y, z) coordinates while the shifted actions reference them by logical (k, f, z) coordinates. The values next(f) and previous(f) are defined in 19.1.3.2.2 of ISO 9040, "start-k" and "end-k" are defined in 19.1.3.5, and "start-y" and "end-y" are defined in 19.1.1.4 of ISO 9040.

If the initial or final coordinate values are undefined then the local action is implementation-dependent. However, a host implementation can use the mandatory FEPCO to control the behavior in such circumstances. Field Entry Conditions are provided to test whether a particular local action would make the entry location leave the current field or navigation path, as defined in 8.3.10.

10. If the VTE-parameter access-outside-fields takes the value "allowed," when data entry terminates, the display pointer shall be aligned with the current entry location by an explicit or implicit addressing operation. In this way, the value of the display pointer notifies the application of the current entry location.
11. Use of the values "F" (Framed) and "C" (Encircled) for emphasis subattribute "h" causes groups of characters within a single field which have this subattribute value to be outlined by a frame. The two subattributes differ only in that the external corners of the frame are squared if value "F" is used and rounded if value "C" is used. An external corner is where two lines meet in a L shape, as distinct from a T junction and from the intersection of two lines. The nature of the external corner is controlled by the subattribute value of the array element on the inside of the corner.

More precisely, a character box element is defined to be within frame (f,z) if it is in the field with coordinates (f,z) and has either the framed or encircled attribute. A character box element is defined to be without frame if either it is not in any field or it does not have either the framed or encircled attribute. In the image of a y-array on the real device, a line is drawn between two adjacent images of character box elements if they are within different frames, or if one is within a frame and one is without frame. In addition if a character box element is within some frame, a line is drawn along any edge of that element which is not in common with any other character box element, i.e., along any edges which are part of the image of the boundary of the Display Object.

8.3.15.2 Informative Notes

1. Updates by the application VT-user (only possible within the z-window) are not necessarily immediately imaged to the (human user of the) terminal VT-user unless the real window of the device is currently positioned over such an update. Such updates may move the real window if a VT-DELIVER indication is received.

When WAVAR is relinquished by the application VT-user the window may be moved so that the field addressed by the CCO is within the window.

Application VT-user addressing operations that advance z to a higher address which is outside of the z-window cause the z-window to move and include one or more new y-arrays for which no fields are defined. As the z-window moves, one or more y-arrays at lower addresses will no longer be included in the z-window. The field definition records for such y-arrays are implicitly deleted.

2. Several of the descriptions of Field Entry Instructions refer to 'empty' array elements of the Display Object. This is to be interpreted in the sense of 13.2 of ISO 9040. Note that in this sense an array element containing a space character is not empty. The representation of an empty array element on the real device is implementation-dependent, but for this reason it is recommended that the representation used should be distinct from that of a space character.
3. The descriptions of a number of Field Entry Conditions refer to the current field and to the current location for the next character entry. Typically this current location will be indicated to the human user by a visible cursor. When this location lies within a defined field, that field is the current field and the Entry Invoke Character FEI may be used to specify the nature of the visible cursor. However, a terminal implementation may allow the visible cursor to be moved outside of any defined field. While this is so, the representation of the cursor is implementation dependent, the current field is undefined and no FEPRs are active.

8.3.16 Specific Conformance Requirements

For further agreement.

8.4 X3 Profile

OIW VTE-Profile X3-1989 (r1, r2, r3, r4, r5, r6)

8.4.1 Introduction

This profile provides support for CCITT X.3 PAD compatible operation.

The purpose of this profile is two-fold:

- a) to provide a transitional environment for applications that assume the availability of X.3 parameters with which to control the behavior of the terminal-system;
- b) to facilitate a gateway function between ISO-VTP and X.3.

8.4.2 Association Requirements

8.4.2.1 Functional Units

The Structured CO Functional Unit is mandatory.

The Urgent Data Functional Unit is optional.

8.4.2.2 Mode

This is an A-mode profile.

8.4.3 Profile Body

Display-objects =

```
{
{
display-object-name = D1,
DO-access          = profile-argument-r1,
dimensions         = "one",
  x-dimension      =
  {
    x-bound        = "unbounded",
    x-addressing    = "not-permitted",
    x-absolute      = "no",
```

```

        x-window      = 0
    },
    repertoire-assignment = <ESC> 2/5 2/15 4/2
                                *( VTS Transparent Set )*
},
    {
    display-object-name = D2,
    DO-access           = opposite of profile-argument-r1,
    dimensions          = "one",
    x-dimension =
    {
        x-bound      = "unbounded",
        x-addressing  = "not-permitted",
        x-absolute    = "no",
        x-window      = 0
    },
    repertoire-assignment = <ESC> 2/5 2/15 4/2
                                *( VTS Transparent Set )*
},
},

```

Control-objects =

```

{
    { *( PAD -
    Each element of the PAD CO represents a CCITT PAD parameter. The CO-element-id
    of each element has been chosen so that it would be the same value as the CCITT PAD
    parameter number that it represents. The PAD CO is used both to set CCITT PAD
    parameter-equivalent values and to reply to an update to the READ CO. See Definitive
    Note 25 for conventions concerning updates to this CO. )*
    CO-name      = PAD,
    CO-structure  = 22,
    CO-access     = "NSAC",
    CO-priority   = "normal",
    CO-trigger    = "not-selected",
    {
        *( X.3 parameter 1 -- PAD recall )*
        CO-element-id      = 1,
        CO-category        = "transparent",
        CO-size             = 8 },
    {
        *( X.3 parameter 2 -- PAD echo )*
        CO-element-id      = 2,
        CO-category        = "boolean",
        CO-size             = 1 },
        {
            *( X.3 parameter 3 -- Data Forwarding Character )*
            CO-element-id   = 3,
            CO-category     = "boolean",
            CO-size         = 7 },
    }
}

```

```

{      *( X.3 parameter 4 -- Idle Timer Delay )*
      CO-element-id      = 4,
      CO-category        = "integer",
      CO-size             = 255 },
{      *( X.3 parameter 5 -- Ancillary Device Control )*
      CO-element-id      = 5,
      CO-category        = "boolean",
      CO-size             = 1 },
{      *( X.3 parameter 6 -- Control of PAD Signals )*
      CO-element-id      = 6,
      CO-category        = "transparent",
      CO-size             = 4 },
{      *( X.3 parameter 7 -- PAD action on receipt of Break )*
      CO-element-id      = 7,
      CO-category        = "boolean",
      CO-size             = 5 },
{      *( X.3 parameter 8 -- Discard Output )*
      CO-element-id      = 8,
      CO-category        = "boolean",
      CO-size             = 1 },
{      *( X.3 parameter 9 -- Padding After <CR> )*
      CO-element-id      = 9,
      CO-category        = "integer",
      CO-size             = 7 },
{      *( X.3 parameter 10 -- Line Folding )*
      CO-element-id      = 10,
      CO-category        = "integer",
      CO-size             = 255 },
{      *( X.3 parameter 11 -- Device Speed )*
      CO-element-id      = 11,
      CO-category        = "symbolic",
      CO-category        = 19 },
{      *(X.3 parameter 12 -- Flow Control by Device )*
      CO-element-id      = 12,
      CO-category        = "boolean",
      CO-size             = 1 },
{      *( X.3 parameter 13 -- Insert <LF> after <CR> )*
      CO-element-id      = 13,
      CO-category        = "boolean",
      CO-size             = 3 },
{      *( X.3 parameter 14 -- Linefeed Padding )*
      CO-element-id      = 14,
      CO-category        = "integer",
      CO-size             = 7 },
{      *( X.3 parameter 15 -- Editing )*
      CO-element-id      = 15,

```



```

        CO-category      = "boolean",
        CO-size           = 1 },
{   *( X.3 parameter 16 -- Character Delete ) *
    CO-element-id        = 16,
    CO-category          = "character",
    CO-repertoire-assignment *( any from CO ) *
                          = "void", "void", <ESC> 2/1 4/0,
    CO-size              = 1 },
{   *( X.3 parameter 17 -- Line Delete ) *
    CO-element-id        = 17,
    CO-category          = "character",
    CO-repertoire-assignment *( any from CO ) *
                          = "void", "void", <ESC> 2/1 4/0,
    CO-size              = 1 },
{   *( X.3 parameter 18 -- Line Display ) *
    CO-element-id        = 18,
    CO-category          = "character",
    CO-repertoire-assignment *( any from CO ) *
                          = "void", "void", <ESC> 2/1 4/0,
    CO-size              = 1 },
{   *( X.3 parameter 19 -- Editing Service Signals ) *
    CO-element-id        = 19,
    CO-category          = "transparent",
    CO-size              = 8 },
{   *( X.3 parameter 20 -- Echo Mask ) *
    CO-element-id        = 20,
    CO-category          = "boolean",
    CO-size              = 8 },
{   *( X.3 parameter 21 -- Parity Treatment ) *
    CO-element-id        = 21,
    CO-category          = "boolean",
    CO-size              = 2 },
{   *( X.3 parameter 22 -- Page Wait ) *
    CO-element-id        = 22,
    CO-category          = "integer",
    CO-size              = 256 }
},

```

```
{ *( READ -
```

Each boolean of the READ CO represents an element-id of the PAD CO with the same identifying value. The READ CO is used to request the current values of PAD CO, which may have been changed by some local agent. See the description of the PAD CO for how the update to this CO modifies the access to the PAD CO.) *

```

CO-name      = READ,
CO-structure = 1,
CO-access    = opposite of profile-argument-r1,

```

```
CO-priority    = "normal",
CO-trigger     = "not-selected",
CO-category    = "boolean",
CO-size        = 22
},
```

```
{ *( Break Out-of-Band -
receipt of this control object represents "X.25 Interrupt"; use is applicable when boolean
1 of element-id 7 in PAD CO has the value "true." )*
```

```
CO-name        = BO,
CO-structure    = 1,
CO-access       = "NSAC",
CO-priority     = "urgent",
CO-trigger      = "not-selected",
CO-category     = "symbolic",
CO-size         = 2
},
```

```
{ *( Break In-Band -
receipt of this control object represents "indication of break"; use is applicable when
boolean 3 of element-id 7 in PAD CO has the value "true." )*
```

```
CO-name        = BI,
CO-structure    = 1,
CO-access       = "NSAC",
CO-priority     = "normal",
CO-trigger      = "selected",
CO-category     = "symbolic",
CO-size         = 2
},
```

```
{ *( CUD -
```

This CO is used to optionally convey Call User Data which is normally carried in the CCITT PAD call. The CO is not updatable, but may be given initial content value by special profile arguments r2 and r3. The CO is parametric, with two elements, one representing the protocol identifier field, and the other representing the call data field containing user data.)*

```
CO-name      = CUD,
CO-structure = 2,
CO-access    = "no-access",
{          *( Protocol Identifier )*
CO-element-id = 1,
CO-category   = "character",
CO-repertoire-assignment *( VTS Transparent Set )*
                        = <ESC> 2/5 2/15 4/2,
CO-size       = 4 },
{          *( User Data )*
CO-element-id = 2,
CO-category   = "character",
CO-repertoire-assignment *(VTS Transparent Set )*
                        = <ESC> 2/5 2/15 4/2,
CO-size       = 124 }
},
```

```
{ *( DTE -
```

This CO is used to optionally indicate the calling and called DTE addresses which are normally available in a true CCITT PAD environment. They may not be updated, but may be given initial content values by special profile arguments r4 and r5.)*

```
CO-name      = DTE,
CO-structure = 2,
CO-access    = "no-access",
{          *( Calling DTE address )*
CO-element-id      = 1,
CO-category        = "character",
CO-repertoire-assignment *(VTS Transparent Set )*
                        = <ESC> 2/5 2/15 4/2,
CO-size            = 15 },
{          *( Called DTE address )*
CO-element-id      = 2,
CO-category        = "character",
CO-repertoire-assignment *(VTS Transparent Set )*
                        = <ESC> 2/5 2/15 4/2,
CO-size            = 15 }
},
```

Table 13 - PAD CO data element 1 value definition

value	meaning
0	not-permitted
1	1/0 character (DLE)
32-126	graphic character

2. The value assigned to element 2 of PAD CO determines whether or not characters are echoed at the terminal-system. When the value of this boolean is "true," then the characters are echoed at the terminal-system.
3. The values assigned to element 3 of PAD CO control the forwarding of characters from the terminal-system to the application-system based on the character value. The defined booleans and associated meanings are:

Table 14 - PAD CO data element 3 value definition

boolean	meaning
1	alphanumeric (A-Z, a-z, 0-9)
2	character 0/13 (CR)
3	characters 1/11 (ESC), 0/7 (BEL), 0/5 (ENQ), 0/6 (ACK)
4	characters 7/15 (DEL), 1/8 (CAN), 1/2 (DC2)
5	characters 0/3 (ETX), 0/4 (EOT),
6	characters 0/9 (HT), 0/10 (LF), 0/11 (VT), 0/12 (FF)
7	all others in column 0 and 1 not already included above

4. The value assigned to element 4 of PAD CO controls the forwarding of characters from the terminal-system to the application-system based on the duration of idle time elapsed between consecutive characters received by the terminal-system from the device. The valid values include any non-negative integer 0-255; a value between 1 and 255 indicates the time-out in twentieths of a second; a value of 0 means that a time-out is not a forwarding condition.
5. The value assigned to element 5 of PAD CO determines whether the XON/XOFF flow-control characters (1/1 and 1/3) are available for use by the terminal-system. When the value of this element is "true," then the flow-control characters are available, and the terminal-system may use them to indicate to the device its readiness to accept characters from it.
6. The value assigned to element 6 of PAD CO determines whether the terminal-system issues

messages, called PAD service signals, to the device during the association. The specific service signals are not a part of this profile definition, only the control of their issue.

7. The values assigned to element 7 of PAD CO determine the behavior at the terminal-system when a Break is received from the device. The defined booleans and associated meanings are:

Table 15 - PAD CO data element 7 value definition

boolean	meaning
1	update BO CO
2	release the association
3	update BI CO
4	return control to terminal-system
5	discard data from application-system

When all booleans have the value "false," there is no action at the terminal-system when a Break is received.

When boolean 1 is "true" and booleans 3 and 5 are "false" and a Break is received from the device, the terminal system updates the BO CO with the symbolic value "alone."

When booleans 1 and 3 are "true" and boolean 5 is "false" and a Break is received from the device, the terminal system updates the BO CO with the symbolic value "prepare" followed by an update to the BI CO with the symbolic value "unconfirmed."

When booleans 1, 3 and 5 are all "true" and a Break is received from the device, the terminal system updates the BO CO with the symbolic value "prepare" followed by an update to the BI CO with the symbolic value "confirmed" and discards all display object updates from the application system until it receives an update to the PAD CO selecting element-id 8.

If boolean 1 is "false," then booleans 3 and 5 must be "false."

If boolean 3 is "false," then boolean 5 must be "false."

Table 16 - BI CO values and semantics

Symbolic Value	Integer Value
unconfirmed	0
confirmed	1

Table 17 - BO CO values and semantics

Symbolic Value	Integer Value
alone	0
prepare	1

~~A useful combination of booleans with value "true" is (1,3,5). When a Break is received, the terminal-system updates both the BO CO and the BI CO and discards all display-object updates from the application-system until it receives an update to the PAD CO for element 8. The result is that the data-path has been cleared in both directions. Notice that this is non-destructive of control object updates.~~

8. The value assigned to element 8 of PAD CO determines whether or not the terminal-system discards data from the application-system. This element works with element 7 to acknowledge the receipt of the Break and resume normal processing of display-object updates. The only valid value of this boolean in an update is "false."
9. The value assigned to element 9 of PAD CO indicates the number of padding characters to be generated by the terminal-system to the device following a carriage return character. The valid values are integers in the range 0-7.
10. The value assigned to element 10 of PAD CO indicates the number of graphic characters sent to the device after which the terminal-system will insert a carriage return. The valid values are integers in the range 0-255, where a value of 0 means that this function is not performed.
11. The value assigned to element 11 of PAD CO indicates the bit-transmission speed of the device. This element may only appear in an update sent to the application-system in response to an update of the READ CO when boolean 11 has the value "true."
12. The value assigned to element 12 of PAD CO determines whether the XON/XOFF flow-control characters (1/1 and 1/3) are available for use by the device. When the value of this element is "true," then the flow-control characters are available, and the device may use them to indicate to the terminal-system its readiness to accept characters from it.
13. The values assigned to element 13 of PAD CO determine under which situations a linefeed is inserted following a carriage return character. The valid values and associated meanings are:

Table 18 - PAD CO data element 13 value definition

boolean	meaning
1	insert linefeed after carriage return sent to device
2	insert linefeed after carriage return received from device
3	insert linefeed after carriage return echoed to the device

14. The values assigned to element 14 of PAD CO determine the number of padding characters generated by the terminal-system to the device following a linefeed character. The valid values are any number in the range 0-7.
15. The value assigned to element 15 of PAD CO determines whether or not the terminal-system performs data-editing. When this CO has value "true," the values of the elements 3 and 4 of the PAD CO are ignored.
16. The value assigned to element 16 of PAD CO determines which character is used in editing the line to signify the function "delete character." The valid values are the IA5 characters, decimal value 0-127. Only applicable if the value of element 15 of PAD CO is "true."
17. The value assigned to element 17 of PAD CO determines which character is used in editing to signify the function "delete line." The valid values are the IA5 characters, decimal value 0-127. Only applicable if the value of element 15 of PAD CO is "true."
18. The value assigned to element 18 of PAD CO determines which character is used in editing to signify the function "display line." The valid values are the IA5 characters, decimal value 0-127. Only applicable if the value of element 15 of PAD CO is "true."
19. The value assigned to element 19 of PAD CO determines whether the terminal-system provides for editing of PAD service signals. The valid values and meanings are as follows:

Table 19 - PAD CO data element 19 value definitions

value	meaning
0	no editing
1	editing as for a paper device
2	editing as for a glass device
8	editing using one editing character
32-126	editing using one editing character

20. The values assigned to element 20 of PAD CO determines which characters are NOT to be echoed to the device by the terminal-system. If no bits are set, then all characters are to be echoed, assuming that element 2 has the value "true." The defined booleans and associated meanings are:

Table 20 - PAD CO data element 20 value definition

boolean	meaning
1	Do not echo 0/13 (CR)
2	Do not echo 0/10 (LF)
3	Do not echo 0/11 (VT), 0/9 (HT), 0/12 (FF)
4	Do not echo 0/7 (BEL), 0/8 (BS)
5	Do not echo 1/11 (ESC), 0/5 (ENQ)
6	Do not echo 0/6 (ACK), 1/5 (NAK), 0/2 (STX), 0/1 (SOH), 0/4 (EOT), 1/7 (ETB), 0/3 (ETX)
7	Do not echo the editing characters defined by data elements 16, 17, and 18 of the PAD CO
8	Do not echo 7/15 (DEL) or any of the other characters belonging to C0 or C1 which are not already mentioned above

21. The value assigned to element 21 of PAD CO determines the treatment of parity on the characters received from and sent to the device from the terminal-system. The defined booleans and associated meanings are:

Table 21 - PAD CO data element 21 value definition

boolean	meaning
1	parity is checked on characters received from the device
2	parity is generated on characters sent to the device

22. The value assigned to element 22 of PAD CO determines the number of linefeeds that the terminal-system may send to the device before it must wait for input from the device to request it to continue displaying characters. The range of valid values is 0-255, where a value of 0 indicates that the terminal-system need never wait.
23. The TEXT operation is the only operation allowed on the display objects.
24. Special profile arguments r2-r6 have binary values. However, due to a restriction in the standards 9040 and 9041, those binary values must be conveyed in the ASN.1 type PrintableString. This is accomplished by mapping the value of each semi-octet in the string of binary octets to an octet whose value falls in the value range of a PrintableString. The semi-octet values in the range 0000 - 1001 are mapped into the PrintableString values '0' - '9', whereas the semi-octet values in the range 1010 - 1111 are mapped into the PrintableString values 'A' - 'F'. The result is a string of characters which is exactly twice the length of the original string of binary octets.
25. The value of CO-access for the PAD CO is "NSAC," however a convention is followed that determines when a VT-user may update the PAD CO. Only the VT-user with access to the Display Object D2 may update the PAD CO except immediately after it has updated the READ CO. When the READ CO update is received by the opposite VT-user, it is treated as a request to update the PAD CO with the parameter values it is currently using, at which point that VT-user is required to respond.
26. The application system can update the BI CO and the terminal system shall send a Break to the device. If the symbolic value of the update is "confirmed," the terminal system shall respond with an update to the PAD CO selecting element-id 8.

8.4.5.2 Informative Notes

1. Users of this profile should refer to CCITT Recommendations X.3, X.28 and X.29 for the original model for this profile.
2. The following values for the elements of the PAD CO are taken from the CCITT Simple standard profile and may prove useful:

Table 20 - CCITT Simple Standard profile

data element	value	meaning
1	1	possible to return control to terminal-system using 0/1 (DLE)
2	1."true"	echo performed at the terminal-system
3	1."false", 2."true", 3."true", 4."true", 5."true", 6."true", 7."true"	forward on receipt of any character in C0 and C1
4	0	no time-out used for forwarding condition
5	1."true"	terminal-system may use XON/XOFF to flow-control the device
6	1."true"	service signals are sent
7	2."true", all others "false"	release the association when a Break is received from the device
8	1."false"	deliver data to device
9	0	do not pad after CR
10	0	do not fold the line
11	read-only	
12	1."true"	device may use XON/XOFF to flow-control the terminal-system
13	0	do not insert LF after CR
14	0	do not pad after LF
15	1."false"	do not edit data
16	7/15 (DEL)	character delete
17	1/8 (CAN)	line delete
18	1/2 (DC2)	line display
19	1	edit as for paper
20	0	echo all characters
21	0	no parity checking or generation
22	0	no page wait

3. The following values for the elements of the PAD CO are taken from the CCITT Transparent standard profile and may prove useful.

Table 21 - CCITT Transparent Standard profile

data element	value	meaning
1	0	control may not be returned to the terminal-system
2	1."false"	terminal-system does not perform character echo
3	all booleans "false"	no forwarding on character value
4	20	forward on time-out of 1 second
5	1."false"	terminal-system may not flow-control the device
6	1."false"	service signals are never sent
7	2."true", all others "false"	release the association when a Break is received from the device
8	1."false"	deliver data to device
9	0	do not pad after CR
10	0	do not fold the line
11	read-only	
12	1."false"	device may not flow-control the terminal-system
13	0	do not insert LF after CR
14	0	do not pad after LF
15	1."false"	do not edit data
16	7/15 (DEL)	character delete
17	1/8 (CAN)	line delete
18	1/2 (DC2)	line display
19	1	edit as for paper
20	0	echo all characters
21	0	no parity checking or generation
22	0	no page wait

8.4.6 Specific Conformance Requirements

None.

8.5 Generalized Telnet Profile

OIW VTE-Profile Generalized Telnet-1991 (r1,r2)

8.5.1 Introduction

This profile provides support for TELNET-like operation for users of the ISO Virtual Terminal Service. It is based on the IS version of ISO 9040 and ISO 9041. This profile references the ARPA Internet TELNET standards documents for the semantics of option negotiation and the values of symbolic constants.

8.5.2 Association Requirements

8.5.2.1 Functional Units

The Structured Control Objects Functional Unit is required. The Urgent Data Functional Unit is optional, but should be used whenever available.

8.5.2.2 Mode

This is an A-mode profile.

8.5.3 Profile Body

Display-objects = *(double occurrence)*

```
{
  {
    display-object-name = D, *(DISPLAY)*
    do-access           = "WACA",
    dimensions          = "two",
      x-dimension      =
      {
        x-bound        = "unbounded",
        x-addressing    = "no constraint",
        x-absolute      = "yes",          *(See Definitive Note 5)*
        x-window        = profile-argument-r1
      },
  },
}
```

```

    y-dimension =
    {
        y-bound      = "unbounded",
        y-addressing  = "higher only",
        y-absolute    = "no",
        y-window      = 1
    },
    erasure-capability = "yes",
    repertoire-capability = *(implicitly defined by r2)*,
    repertoire-assignment = profile-argument-r2,
    repertoire-assignment = <ESC> 2/5 2/15 4/2
},
{
    display-object-name = K, *(KEYBOARD)*
    do-access           = "WACI",
    dimensions          = "two",
    x-dimension =
    {
        x-bound      = "unbounded",
        x-addressing  = "no constraint",
        x-absolute    = "yes",          *(See Definitive Note 5)*
        x-window      = profile-argument-r1
    },
    y-dimension =
    {
        y-bound      = "unbounded",
        y-addressing  = "higher only",
        y-absolute    = "no",
        y-window      = 1
    },
    erasure-capability = "yes",
    repertoire-capability = *(implicitly defined by r2)*,
    repertoire-assignment = profile-argument-r2,
    repertoire-assignment = <ESC> 2/5 2/15 4/2
},
},

Control-objects = *(multiple occurrence)*
{
    { *(SYNCHRONIZE)*
        CO-name      = SY,
        CO-category   = "symbolic",
        CO-access     = "NSAC",
        CO-size       = 1,
        CO-priority    = "urgent"
    },
}

```

```

{ *(DISPLAY-SIGNAL)*
    CO-name      = DI,
    CO-category  = "symbolic",
    CO-size      = 255,
    CO-access    = "WACA",
    CO-priority  = "normal",
    CO-trigger    = "selected"
},
{ *(KEYBOARD-SIGNAL)*
    CO-name      = KB,
    CO-category  = "symbolic",
    CO-size      = 255,
    CO-access    = "WACI",
    CO-priority  = "normal",
    CO-trigger    = "selected"
},
{ *(NEGOTIATION BY INITIATOR)*
    CO-name      = NI,
    CO-structure = 2,
        *(DO/DONT)*
        CO-element-id = 1,
        CO-category   = "boolean",
        CO-size       = 256,
        *(WILL/WONT)*
        CO-element-id = 2,
        CO-category   = "boolean",
        CO-size       = 256,
    CO-access    = "WACI",
    CO-priority  = "normal",
    CO-trigger    = "selected"
},
{ *(NEGOTIATION BY ACCEPTOR)*
    CO-name      = NA,
    CO-structure = 2,
        *(DO/DONT)*
        CO-element-id = 1,
        CO-category   = "boolean",
        CO-size       = 256,
        *(WILL/WONT)*
        CO-element-id = 2,
        CO-category   = "boolean",
        CO-size       = 256,
    CO-access    = "WACA",
    CO-priority  = "normal",
    CO-trigger    = "selected"
},

```

```

{ *(SUBNEGOTIATION BY INITIATOR)*
    CO-name      = SBI,
    CO-structure  = 2,
        *(TELNET OPTION)*
        CO-element-id = 1,
        CO-category   = "symbolic",
        CO-size        = 256,
        *(SUBNEGOTIATION)*
        CO-element-id = 2,
        CO-category   = "character",
        CO-repertoire-assignment = <ESC> 2/5 2/15 4/2,
        *(Virtual Terminal Service Transparent Set)*
        CO-size        = 1024,
    CO-access     = "WACI",
    CO-priority    = "normal",
    CO-trigger     = "selected"
},
{ *(SUBNEGOTIATION BY ACCEPTOR)*
    CO-name      = SBA,
    CO-structure  = 2,
        *(TELNET OPTION)*
        CO-element-id = 1,
        CO-category   = "symbolic",
        CO-size        = 256,
        *(SUBNEGOTIATION)*
        CO-element-id = 2,
        CO-category   = "character",
        CO-repertoire-assignment = <ESC> 2/5 2/15 4/2,
        *(Virtual Terminal Service Transparent Set)*
        CO-size        = 1024,
    CO-access     = "WACA",
    CO-priority    = "normal",
    CO-trigger     = "selected"
},

```

Device-objects = *(double occurrence)*

```

{
    {
        device-name      = DISPLAY-DEVICE,
        device-display-object = D,
        device-default-CO-initial-value = 1."true",*(on)*
        device-minimum-X-array-length = 1,*(no constraint)*
        device-minimum-Y-array-length = 1,*(no constraint)*
        device-control-object = SY,
        device-control-object = NA,
        device-control-object = DI,
    }
}

```



```

device-control-object = SBA,
    *(SYNC, NEGOTIATE-ACCEPTOR,
      DISPLAY-SIGNAL, SUBNEGOTIATE-ACCEPTOR)*
device-default-CO-access    = "WACA",
device-default-CO-priority  = "normal"
*(other device object parameters assume corresponding
DO values)*
},

{
device-name                = KEYBOARD-DEVICE,
device-display-object      = K,
device-default-CO-initial-value    = 1,"true",*(on)*
device-minimum-X-array-length      = 1,*(no constraint)*
device-minimum-Y-array-length      = 1,*(no constraint)*
device-control-object = SY,
device-control-object = NI,
device-control-object = KB,
device-control-object = SBI,
    *(SYNC, NEGOTIATE-INITIATOR,
      KEYBOARD-SIGNAL, SUBNEGOTIATE-INITIATOR)*
device-default-CO-access    = "WACI",
device-default-CO-priority  = "normal"
*(other device object parameters assume corresponding
DO values)*
}

```

Type of delivery control = "simple-delivery-control."

8.5.4 Profile Argument Definitions

- r1 - is used to represent the line length as the value of VTE parameter x-window for both display objects. This argument is mandatory and takes a nonnegative integer value. This argument is identified by the identifier for x-window for display object D.
- r2 - is used to designate the repertoires for both display objects. This argument is optional, and may occur a number of times in an ordered list to provide for negotiation of values for the VTE-parameter repertoire-assignment. The value for the VTE-parameter repertoire-capability is implied by the number of occurrences of this profile argument. The VTE-parameter repertoire-capability equals the number of occurrences of this profile argument plus one. The default is a single occurrence of the value designating the full US ASCII set. This argument is identified by the identifier for repertoire assignment for display object D.

8.5.5 Profile Dependent CO Information

8.5.6 Profile Notes

8.5.6.1 Definitive Notes

1. Sending a KB or DI control object update is the equivalent of sending a TELNET "IAC <command>" sequence. The symbolic value in the KB or DI control object update is equal to the TELNET command code as specified in the TELNET Assigned Numbers.

The following values must be recognized:

SYMBOLIC	NAME	VALUE
DM	Data Mark	242
BRK	Break	243
IP	Interrupt Process	244
AO	Abort output	245
AYT	Are You There	246
GA	Go ahead	249

The following values, corresponding to TELNET commands, are excluded from KB and DI control object updates:

SYMBOLIC	NAME	VALUE
SE	End Subnegotiation	240
EC	Erase character	247
EL	Erase Line	248
SB	Subnegotiation	250
WILL	Will	251
WONT	Won't	252
DO	Do	253
DONT	Don't	254
IAC	Escaped IAC	255

The NI and NA control objects are used in place of the DO, DONT, WILL, WONT commands.

The SBI and SBA control objects are used in place of the SB <suboptions> SE command sequence.

The EC and EL commands are replaced by display object updates.

The IAC is not needed because commands are not embedded in the text.

The recognition of values corresponding to TELNET commands defined in a TELNET option will be dependent upon the successful negotiation of the TELNET option that defines the additional TELNET command. Unrecognized values shall be ignored.

2. The equivalent of a TELNET SYNCH command is achieved by updating the SY control object with the single symbolic value of "SYNCH" (which is mapped onto the integer value 1), and immediately updating the DI (or KB) control object with symbolic value DM. When an update to the SY control object is received subsequent display object updates are discarded until an update to the DI or KB control is received with symbolic value DM. If a VT-BREAK is received after an SY CO update has been received and prior to the corresponding DI or KB CO update with symbolic value of DM, the discarding of updates is terminated. This is necessary because the VT-BREAK may have caused the DI or KB CO update to be purged.
3. The NI and NA control objects are used to emulate the TELNET option negotiation facility. The facility is symmetric, allowing either party to open negotiation for a change of mode, and every negotiation must be accepted or rejected by the opposite party. The rules for negotiation for each of the option controls are as stated in the TELNET specification and as given below:
 - a. Only open negotiation for a change from the current state;
 - b. Only acknowledge negotiation for a change from the current state;
 - c. Do not send any object updates with a negotiation outstanding except an update to the NI (or NA) control object to acknowledge negotiation.

NI and NA are structured control objects consisting of two boolean data elements. For full symmetry, both NI and NA have the same value definitions. The first boolean data element stands for DO/DONT and the second boolean data element stands for WILL/WONT. The ordinal position of the boolean value in the data element corresponds to the TELNET option number plus one. This allows the ordinal position of bits 1-256 in the boolean object to represent the TELNET options values of 0-255. DO is represented as a "true" boolean value in CO-element-id 1. DONT is represented as a "false" boolean value in CO-element-id 1. WILL is represented as a "true" boolean value in CO-element-id 2. WONT is represented as a "false" boolean value in CO-element-id 2.

4. The SBI and SBA control objects provide subnegotiation for TELNET options, and correspond to the TELNET command sequence "IAC SB <TELNET option code> <subnegotiation> IAC SE". Element id 1 contains the TELNET option code, and element id 2 contains the octets that comprise the subnegotiation. The specification for the TELNET option defines the semantics of the value in element id 2.
5. The TELNET EC (erase character) command will be mapped to a pointer relative ($x := x-1$)

update and an erase current update. This is the only instance when backward explicit addressing is permitted.

The TELNET EL (erase line) command will be mapped to an erase-full-x-array update (an erase operation where the extent is defined as <"start-x,"Yc,Xc-1"> and a pointer update to set x = 1. This is the only instance when absolute explicit addressing is permitted.

6. The X address of the pointer can be moved forward only by implicit pointer addressing. Addressing of the Y dimension is limited to the next X-array update operation.
7. The VT next X-array update operation will be sent in place of the TELNET NVT "CR, LF" sequence.
8. When a party wants to change a repertoire assignment, it must complete a successful TELNET option negotiation to change the repertoire in use. Then the party with the access rights to the display object in question is required to issue a corresponding update to the modal value for the character-repertoire attribute. If a negotiation to change repertoire is refused, the current repertoire will remain in effect.

Use of the Transparent character set for a display object is similarly effected by a modal attribute update following successful negotiation of the TELNET Binary Option. When a negotiation to quit using the "binary" repertoire succeeds, it is to be treated as a negotiation to use the repertoire specified by the first value of the repertoire-assignment VTE-parameter.

~~Use of the Transparent character set for the D and K display objects is controlled by the negotiation of the TELNET Binary Option. When a party wants to change a repertoire assignment, it must complete a successful TELNET negotiation to change the option control. Then the party with the access rights to the display object in question is required to perform the corresponding secondary attribute modal update. If a negotiation to change to "binary" repertoire is refused, the current repertoire will remain in effect. When a negotiation to quit using the "binary" repertoire succeeds, the party with the access rights to the display object in question is required to perform the corresponding secondary attribute modal update to switch to the repertoire designated by the first repertoire-assignment parameter.~~

9. While the "binary" repertoire is being used no mapping to the pointer addressing or erase operations will be done.
10. The repertoire designation "7-bit ASCII (G0+C0)" refers to the repertoire invoked by ISO 2022 defined character set designating escape sequences <ESC> 2/8 4/2, "void," <ESC> 2/1 4/0. The repertoire designation "7-bit ASCII (G0 only)" refers to the repertoire invoked by ISO 2022 defined character set designating escape sequences <ESC> 2/8 4/2. The designation "binary" refers to the "Virtual Terminal Service Transparent Set" registered in the International Register under ISO 2375 register value 125 and invoked by the escape sequence <ESC> 2/5 2/15 4/2.

11. No termination event list is specified so that data buffering and delivery can be controlled according to context. If local echoing is enabled, the local newline or other event shall trigger a VT-DELIVER request. With remote echo a timeout or buffer length may be used to trigger a VT-DELIVER request. This buffer length may be 1.

8.5.6.2 Informative Notes

1. Users of this profile should refer to the TELNET specification (MIL-STD-1782) and RFCs:

854 Protocol Specification
855 Options Specification

or their successors for semantics of the TELNET commands. These documents can be obtained by contacting SRI International, DDN Network Information Center, 333 Ravenswood Ave., Menlo Park, CA 94025, (415) 859-3695.

2. This profile is derived from the Telnet-1988 profile. The negotiation control objects, NA and NI, have been changed to model the DO/DONT WILL/WONT negotiation of TELNET options. The size of the elements of the NA and NI negotiation control objects equals the range of TELNET option numbers, including the numbers presently assigned and those reserved for future options. An implementation can refuse options that it doesn't support. This allows implementations to maintain interoperability while new TELNET options are incorporated. The CO-category of the KB and DI control objects have been changed from "boolean" to "symbolic." A "Go-Ahead" will be signaled by a control object update to the DI or KB control object with symbolic value of GA; therefore, the GA control object has been dropped.
3. If the "go ahead" facility has been negotiated then following a VT-BREAK, only the association acceptor has the right to send data. In the event of VT-BREAK the echo control objects are reinitialized to "false," meaning local echo. If remote echo is desired it must be re-negotiated following VT-BREAK.

8.5.7 Specific Conformance Requirements

The following character sets are required:

- The G0 character set for U.S. ASCII (values 32-126);
- The full U.S. 7-bit ASCII (values 0-127);
- The transparent character set, see Definitive Note 8 in section 14.8.5.6.1.

Negotiation to Suppress GoAhead must be accepted

Annex A (normative)

Specific ASE Requirements

For specific ASE Requirements identified by the Upper Layer SIG for Virtual Terminals, see Stable Implementation Agreements for Open Systems Interconnection Protocols: Part 5 - Upper Layers.

Annex B (normative)

ClarificationsDefaults

When a profile argument is not present in either the offer or value list, the default for the corresponding VTE parameter is specified by ISO 9040 if it is not given by the argument description in the profile.

Annex C (normative)

Object Identifiers

General identifiers:

```
oiw-vt          OBJECT IDENTIFIER ::=
    { iso(1) identified-organization(3) oiw(14) vtsig(12) }
```

```
oiw-vt-pr       OBJECT IDENTIFIER ::=
    { oiw-vt          vteProfile(1) }
```

```
oiw-vt-co       OBJECT IDENTIFIER ::=
    { oiw-vt          controlObject(0) }
```

```
oiw-vt-co-misc  OBJECT IDENTIFIER ::=
    { oiw-vt-co       cotypemisc(0) }
```

```
oiw-vt-co-tcco  OBJECT IDENTIFIER ::=
    { oiw-vt-co       cotypetcco(4) }
```

Profiles defined by OIW VT SIG:

```
oiw-vt-pr-telnet-1988  OBJECT IDENTIFIER ::=
    { oiw-vt-pr        telnet-1988(0) }
```

```
oiw-vt-pr-transparent-1988  OBJECT IDENTIFIER ::=
    { oiw-vt-pr        transparent-1988(1) }
```

```
oiw-vt-pr-forms-1989   OBJECT IDENTIFIER ::=
    { oiw-vt-pr        forms-1989(2) }
```

```
oiw-vt-pr-x3-1989      OBJECT IDENTIFIER ::=
    { oiw-vt-pr        x3-1989(4) }
```

```
oiw-vt-pr-generalizedTelnet  OBJECT IDENTIFIER ::=
    { oiw-vt-pr        generalizedTelnet(5) }
```

Control Objects defined by OIW VT SIG:

```
oiw-vt-co-misc-sa      OBJECT IDENTIFIER ::=
    { oiw-vt-co-misc    sa(0) }
```

```
oiw-vt-co-misc-ua      OBJECT IDENTIFIER ::=
    { oiw-vt-co-misc    ua(1) }
```


oiw-vt-co-misc-st OBJECT IDENTIFIER ::=
 { oiw-vt-co-misc st(2) }

oiw-vt-co-misc-ut OBJECT IDENTIFIER ::=
 { oiw-vt-co-misc ut(3) }

Object Identifiers used by the S-mode Paged Profile:

Object Identifiers used by the S-mode Paged Profile are defined
in PDISP 11187-2 (AVT 23-S-mode Paged Application Profile.)

Stable Implementation Agreements for Open Systems Interconnection Protocols: Part 15 - Transaction Processing

Output from the September 1992 Open Systems
Environment Implementors' Workshop (OIW)

SIG Chair:	Jeff Hildebrand, Boeing Computer Services
SIG Editor:	Jeff Hildebrand, Boeing Computer Services

Foreword

This part of the Stable Implementation Agreements was prepared by the Transaction Processing Special Interest Group (TPSIG) of the Open Systems Environment Implementors' Workshop (OIW).

Text in this part has been approved by the Plenary of the above-mentioned Workshop. No significant technical change has occurred in this part since it was previously presented.

This part is submitted as camera-ready material. Redline and Strikeout were not used in this text. If you have any questions regarding this part, please call the TP SIG Chair.

Foreword

This part of the Stable Agreements was prepared by the Transaction Processing Special Interest Group (TPSIG) of the Open Systems Environment (OIW). See Procedures Manual for Workshop charter.

Text in this part has been approved by the Plenary of the above-mentioned Workshop. This part replaces the previously existing chapter on this subject. There is some change from this text as previously given. References are made to other sections of both the Working and Stable agreements.

Future changes and additions to this version of these Implementor Agreements will be published as a new part. Deleted and replaced text will be shown as . New and replacement text will be shown as shaded.

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TITLE: Information Technology - Open Systems Interconnection - International Standardized Profile
12061-1: OSI TP

Part 1 : INTRODUCTION

SOURCE: Joint AOW / EWOS / OIW on Transaction Processing

DATE: September 25, 1992

STATUS: This document has been produced during the second AOW/EWOS/OIW joint meeting on Transaction Processing (Brussels - June 23-26, 1992). Its content is considered by the three experts groups as harmonized, and all issues have been resolved. The OIW, formally, considers this document to be harmonized with all issues resolved and will submit it to ISO/IEC JTC1/SGFS when the document is approved by the other workshop plenaries. The final document is expected to be submitted to ISO/IEC JTC1/SGFS by November 1992.

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1. SCOPE
2. NORMATIVE REFERENCES
3. DEFINITIONS AND ABBREVIATIONS
4. NOTATION
5. TAXONOMY STRUCTURE
 - 5.1 Guidelines for splitting up the profiles
 - 5.2 Support of OSI TP Functional Units
 - 5.3 Transaction Processing Profiles tree
6. CONFORMANCE

INTRODUCTION

The aim of Open Systems Interconnection is to allow, with a minimum of technical agreement outside the interconnection standards, the interconnection of computer systems:

- a. from different manufacturers,
- b. under different management,
- c. of different levels of complexity,
- d. of different technologies.

Transaction Processing is concerned with identifiable information which can be related as transactions, which may involve two or more Open Systems. In the framework of Open Systems Interconnection (OSI) a transaction is defined as "a set of related operations characterized by four properties: atomicity, consistency, isolation and durability."

The definition highlights that a distributed transaction is more than a simple exchange of messages, but that the exchanges form a protected indivisible set.

This multi-part document contains the complete specification of the six profiles identified in M-IT-02 and TR 10000.

Part 1 contains the taxonomy for the OSI TP profiles.

Part 2 contains the specification of the support of OSI TP APDUs for each of the profiles specified in Parts 5 to 10.

Part 3 contains the specification of the support of the CCR APDUs for each of the profiles specified in Part 5 to 10.

Part 4 contains the specification of the support of ACSE, Presentation and Session APDUs for each of the profiles specified in Part 5 to 10.

Parts 5 to 10 specify the six profiles which are defined, based on the OSI TP standard. These six parts make reference to Parts 2 to 4.

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Information Technology - Open Systems Interconnection - International Standardized Profiles
12061-1: OSI Distributed Transaction Processing.

Part 1: INTRODUCTION

1. SCOPE

Part I of this document introduces the overall structure of the specification of the OSI TP profiles. This includes:

- a) the identification of the Transaction Processing profiles defined in this document, together with the Transaction Processing Profiles Tree;
- b) the identification of the various Parts which constitute this document;
- c) the list of the references to other standards relevant to the definition of the OSI TP profiles;
- d) the definitions and abbreviations used through the various parts of this document.

2. NORMATIVE REFERENCES

The following documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC ISP 12061. At the time of publication, the editions indicated were valid. All documents are subject to revision, and parties to agreements based on this part of ISO/IEC ISP 12061 are warned against automatically applying any more recent editions of the documents listed below, since the nature of references made by ISPs to such documents, is that they may be specific to a particular edition. Members of IEC and ISO maintain registers of currently valid International Standards and ISPs, and CCITT maintains published editions of its current Recommendations.

The following ISO standards contain provisions for the definition of Transaction Processing profiles and are referenced in this document:

ISO/IEC 8327 ¹	Information Processing Systems - Open Systems Interconnection - Basic connection oriented session protocol specification
ISO/IEC DIS 8327-2	Information Processing Systems - Open Systems Interconnection - Basic connection oriented session PICS Proforma.
ISO/IEC 8327 AM3	Information Processing Systems- Open Systems Interconnection - Session. Additional resynchronisation functionality.
ISO/IEC 8650	Information Processing Systems - Open Systems Interconnection Protocol Specification for the Association Control Service Element.

¹ Second edition to be published

ISO/IEC DIS 8650-2	Information Processing Systems - Open Systems Interconnection - PICS Proforma for the Association Control Service Element.
ISO/IEC 8823:1988	Information Processing Systems - Open Systems Interconnection - Connection Oriented Presentation Protocol Specification.
ISO/IEC DIS 8823-2	Information Processing Systems - Open Systems Interconnection - Connection Oriented Presentation PICS Proforma.
ISO/IEC 8823 AM5	Information Technology - Open Systems Interconnection - Presentation. Additional resynchronisation functionality.
ISO/IEC 8825:1990	Information Processing Systems - Open Systems Interconnection - Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1).
ISO/IEC 9805-1:1990	Information Technology - Open Systems Interconnection - Protocol Specification for the Commitment, Concurrency and Recovery service element.
ISO/IEC DIS 9805-2	Information Technology - Open Systems Interconnection - CCR PICS Proforma.
ISO/IEC 9805 AM2	Information Technology - Open Systems Interconnection - CCR. Session mapping changes.
ISO/IEC 10026-1:1992	Information Technology - Open Systems Interconnection - Distributed Transaction Processing: Model.
ISO/IEC 10026-2:1992	Information Technology - Open Systems Interconnection - Distributed Transaction Processing: Service Definition.
ISO/IEC 10026-3:1992	Information Technology - Open Systems Interconnection - Distributed Transaction Processing: Protocol Specification.
ISO/IEC DIS 10026-4	Information Technology - Open Systems Interconnection - Distributed Transaction Processing: PICS Proforma
ISO/IEC 11188-1 ²	Information Technology - International Standardized Profile-Common Upper Layer Requirements

² Currently a regional workshop document

TITLE: WORKING DOCUMENT FOR

**Information Technology - Open Systems Interconnection - International Standardized Profile
xxxxx: OSI TP**

Part 4: Support of ACSE, Presentation and Session Protocols.

SOURCE: Joint AOW / EWOS / OIW on Transaction Processing

DATE: June 26, 1992

NOTE: This document is the result of the second formal joint meeting between the AOW TP SIG, the EWOS/EGTP and the OIW TP SIG and liaison with the June 1992 OIW.

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1. SCOPE
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4. NOTATION
5. SUPPORT OF OSI SESSION PROTOCOL
6. SUPPORT OF OSI PRESENTATION PROTOCOL
7. SUPPORT OF OSI ACSE PROTOCOL
8. CONFORMANCE

ANNEX

- A. SUPPORT OF THE SESSION PROTOCOL (NORMATIVE)
- B. SUPPORT OF THE PRESENTATION PROTOCOL (NORMATIVE)
- C. SUPPORT OF THE ACSE PROTOCOL (NORMATIVE).

3. DEFINITIONS AND ABBREVIATIONS

The definitions and abbreviations in this document not listed in this section are found in the TP model document (ISO/IEC 10026-1).

AS -	Conformance class for Application Supported Transaction
CP -	Conformance class for Chained Provider Supported Transaction Branches
UP -	Conformance class for Unchained Provider Supported Transaction Branches
FU -	Functional Unit
ISP -	International Standardized Profile
PDU -	Protocol Data Unit
PPDU -	Presentation Protocol Data Unit
SPDU -	Session Protocol Data Unit

4. NOTATION

The following notations are used in the tables contained in Parts 2 to 4 of this ISP:

- 1) The Item Number uniquely identifies each capability, parameter or field within the tables.
- 2) The Parameter column provides the name of each PDU parameter.
- 3) The Base Standard Status column indicates static requirements as defined by the base standard PICS Proforma.

The notation used in this column is as defined:

- in the OSI TP and CCR PICS proforma documents for the OSI TP and CCR related tables;
- in the "Common Upper Layer Requirement" document for ACSE, Presentation and Session related tables.

However, as the ISP is not intended to duplicate the information contained in the documents listed above, the notation has been simplified as follows:

- "C" is used instead of any "Cxxx", where xxx is an integer.
- "O.n" is used instead of any "O.xxx", where xxx is an integer.

The exact definition of conditions and options will be found in the referenced documents.

Note that the "M" and "O" notations have not been changed.

Note that the "D" (default) notation may be used in this column, whilst it is not used in the PROFILE Status column (included within the M notation).

- 4) The Profile ID column, if present, defines how this parameter is used by a specific profile.
When this column is empty, the feature applies to all profiles to which the PDU applies.
- 5) The Profile Status column indicates the requirements for the feature.

These requirements are valid only within the scope of a specific profile, i.e., they apply to an instance of an implementation operating within the limits specified by that profile. For instance, the notation NA used for some feature does not preclude an implementation from supporting more than one profile.

M = Mandatory. The feature shall be supported, i.e. its syntax and procedures shall be implemented as specified in the base standard or restricted by this ISP, by all implementations claiming conformance to this profile. It is not necessary that a mandatory parameter appears in all instances of

communication when either a default value has been specified, or this parameter is not used at the service level.

- C = Conditional. Any feature so marked must be implemented under the conditions specified in the profile (e.g. Mandatory, Not Applicable, etc., for a certain instance of communication). The requirements for the feature then follow the rules of M, NA, etc.
- O = Optional. This is an optional feature in the base standard. It is left to the implementor as to whether this feature is implemented. Optional features for a sender need not be implemented. Optional features for a receiver must be recognized and may be processed in a manner consistent with the base standard, or these profiles. If implemented, a feature will be subject to conformance testing.
- NA = Not Applicable. This feature is not defined in the context where it is mentioned because it is either logically or physically impossible for the feature to occur. The occurrence of this feature is a protocol error. It will be handled as specified in the base standard or this ISP.
- I = Out of Scope. This is an optional feature of a base standard. However, this feature is not used by the profile nor by a referencing specification. If such a feature is received it is processed according to local procedures. Local procedures are procedures that are not defined by any base standards or profiles. It will not generate a protocol error.

There are presently some instances where features marked 'M' in the base standard are marked 'I' in this profile. This has been done only because the base standard PICS are not yet at full international standard status and it is believed that the markings of the feature will change during progression to full international standard status. It is intended to remove all such inconsistencies with the base standard before publication of this ISP.

- * = U-ASE defined. This is an optional feature of a base standard. This feature may or may not be used by a referencing specification. How it is used is specified by the referencing specification. When a default value is given in this profile, the referencing specification may choose not to specify any value in which case, the default value applies. A default value is specified in parentheses following the *, e.g., *(I).
- O.N= The notation O.N, where N is an integer, is used in some Status Columns. This notation indicates a reference to a unique group of capabilities. A note (as indicated in the Notes Column) will explain the exact requirement using one of the following forms:
 - O.N = Support of exactly one of these items is required.
 - O.N = Support of at least one of these items is required.It is always necessary to consult the corresponding note to determine which situation applies.

When status for sending and receiving values differ, they will be separated by a slash, with the sender on the left and receiver on the right. If they are the same there will only be one status in the cell. The integer suffix to a status refers to a condition that will be found either immediately following that table, or following an earlier table in the same part of this ISP.

- 6) The T/L/V Allowed column specifies the range of types, length, or values this parameter can assume or contain. This column can have multiple definitions based on which profile is being described. When multiple definitions are possible this column will be defined in conjunction with the Profile ID column. The notation {} denote no bits in the parameter's value.
- 7) The Notes column points to notes following the table.

5. TAXONOMY STRUCTURE

5.1. GUIDELINES FOR SPLITTING UP THE PROFILES

This subclause specifies which functional units combine to form each profile. Refer to the appropriate part of this ISP for the specification of how a specific profile uses a PDU and its parameters. Profiles are identified by a coding method which consists of two levels, but which can easily be expanded as future needs warrant. The first level indicates the conformance class. The second level indicates whether polarized or shared control is used. The levels are defined as:

Level one:

- 1.- Application Supported transactions.
- 2.- Provider supported unchained transactions.
- 3.- Provider supported chained transactions.

Level two:

- 1.- Polarized control.
- 2.- Shared control.

5.2 TRANSACTION PROCESSING PROFILES TREE

The figure hereafter gives the Transaction Processing Profiles tree:

Transaction Processing	ATP
Application Supported Transactions	ATP1
Polarized Control	ATP11
Shared Control	ATP12
Provider Supported Unchained Transactions	ATP2
Polarized Control	ATP21
Shared Control	ATP22
Provider Supported Chained Transactions	ATP3
Polarized Control	ATP31
Shared Control	ATP32

The first level of this decomposition (ATPx) corresponds to the definition of the three conformance classes defined in the OSI TP standard. The second level (ATPxy) corresponds to the selection between Polarized Control and Shared Control for each of the conformance classes. The conformance classes and the functional units that compose them are summarized in the following list:

1. ATP-11 Application Supported Transactions - Polarized Control:
DIALOGUE + HANDSHAKE + POLARIZED CONTROL
2. ATP-21 Provider Supported Unchained Transactions - Polarized Control:
DIALOGUE + HANDSHAKE + POLARIZED CONTROL + COMMIT + RECOVERY +
UNCHAINED TRANSACTION
3. ATP-31 Provider Supported Chained Transactions - Polarized Control:
DIALOGUE + HANDSHAKE + POLARIZED CONTROL + COMMIT + RECOVERY +
CHAINED TRANSACTION
4. ATP-12 Application Supported Transactions - Shared Control:
DIALOGUE + HANDSHAKE (Optional) + SHARED CONTROL
5. ATP-22 Provider Supported Unchained Transaction - Shared Control:
DIALOGUE + HANDSHAKE (Optional) + SHARED CONTROL + COMMIT + RECOVERY +
UNCHAINED TRANSACTION
6. ATP-32 Provider Supported Chained Transactions - Shared Control:
DIALOGUE + HANDSHAKE (Optional) + SHARED CONTROL + COMMIT + RECOVERY +
CHAINED TRANSACTION

Since the Profile ID is not carried as a protocol parameter, implementations may determine the profile governing a particular instance of communication by the TP Functional Units selected for that dialogue.

6. CONFORMANCE

This part of ISO/IEC ISP 12061 states requirements upon implementors to achieve inter networking. A claim of conformance to one of parts five to ten of this ISP is a claim that all requirements in the relevant base standards are satisfied, and that all requirements in the relevant parts are satisfied.

Annexes to parts two, three and four state the relationship between these requirements and those of the base standard.

There is no conformance requirement from this ISP on features marked *** in the annexes of parts two and four.

Each of parts five to ten contain specific conformance requirements for that part.

TITLE: WORKING DOCUMENT FOR

Information Technology - Open Systems Interconnection - International Standardized Profile
12061-2: OSI TP

Part 2: Support of OSI TP APDUs.

SOURCE: Joint AOW / EWOS / OIW on Transaction Processing

DATE: September 25, 1992

STATUS: This document has been produced during the second AOW/EWOS/OIW joint meeting on Transaction Processing (Brussels - June 23-26, 1992). Its content is considered by the three experts groups as harmonized, and all issues have been resolved. The OIW, formally, considers this document to be harmonized with all issues resolved and will submit it to ISO/IEC JTC1/SGFS when the document is approved by the other workshop plenaries. The final document is expected to be submitted to ISO/IEC JTC1/SGFS by November 1992.

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1. SCOPE
2. NORMATIVE REFERENCES
3. DEFINITIONS and ABBREVIATIONS
4. NOTATION
5. SUPPORT OF OSI TP PROTOCOL
6. CONFORMANCE

ANNEX

- A. SUPPORT OF THE OSI TP PROTOCOL (NORMATIVE).

INTRODUCTION

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This multi-part document contains the complete specification of the six profiles identified in M-IT-02 and TR 10000.

Part 1 contains the taxonomy for the OSI TP profiles.

Part 2 contains the specification of the support of OSI TP APDUs for each of the profiles specified in Parts 5 to 10.

Part 3 contains the specification of the support of the CCR APDUs for each of the profiles specified in Part 5 to 10.

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Parts 5 to 10 specify the six profiles which are defined, based on the OSI TP standard. These six parts make reference to Parts 2 to 4.

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**Information Technology - Open Systems Interconnection -
International Standardized Profiles 12061-2: OSI Distributed
Transaction Processing.**

Part 2: SUPPORT OF OSI TP APDUs

1. SCOPE

This part of this ISP specifies the status for the support of the OSI TP protocol for the profiles identified in Part 1 of this ISP.

2. NORMATIVE REFERENCES

The references listed in Part 1 of this ISP apply.

3. DEFINITIONS AND ABBREVIATIONS

The definitions and abbreviations contained in Part 1 of this ISP apply to this Part.

4. NOTATION

The notation introduced in Part 1 of this ISP applies to this Part.

5. SUPPORT OF OSI TP PROTOCOL

The support of the OSI TP protocol is as described in Annex A (normative).

The structure of Annex A is based on the structure of Annex A of ISO/IEC 10026-4, in particular in the numbering of the clauses.

When a clause of Annex A of ISO/IEC 10026-4 is not relevant to the profiles, this is stated.

6. Conformance

To conform to the OSI TP Protocol used in any of the profiles in this ISP, an implementation shall implement, according to the specifications given in ISO/IEC 10026-3:

1. All the mandatory features identified in Annex A.
2. All the selected optional features, as identified in the completed TP PICS.

ANNEX A: SUPPORT OF THE OSI TP PROTOCOL (Normative)

A.1. Identification

No restriction is applied to clause A.1 of ISO/IEC 10026-4 by this part of ISO/IEC ISP 12061.

A.2. CLAIMED CONFORMANCE TO STANDARDS

A.2.1. ISO/IEC 10026-3

A.2.1.1. VERSION NUMBER(S)

Answer shall be "NONE".

A.2.1.2. GLOBAL CONFORMANCE CLAIM

Answer shall be "YES".

A.2.2. ISO/IEC 10026 AMENDMENTS

Both answers shall be "NONE".

A.2.3. ISO/IEC 10026 TECHNICAL CORRIGENDA

Both answers shall be "NONE".

Note: At the time of the approval of the final text of this ISP, no Technical Corrigenda was approved for ISO/IEC 10026. When this will become false, the present ISP will be corrected accordingly.

A.2.4. CONFORMANCE CLASS(ES) SUPPORTED

Table 1 - CONFORMANCE CLASSES SUPPORTED

ITEM #	CONFORMANCE CLASSES	ISO/IEC 10026-4	PROFILES						
			11	21	31	12	22	32	NOTES
1	Application Transaction Branches	O	M	NA	NA	M	NA	NA	
2	Chained Provider Supported Transaction Branches	O	NA	NA	M	NA	NA	M	
3	Unchained Provider Supported Transaction Branches	O	NA	M	NA	NA	M	NA	

NOTES

Conformance to more than one profile may be claimed for an implementation. For example, an implementation that conforms to profile 21 will often be capable of conforming to the corresponding Profile 11.

A.3. FUNCTIONAL UNITS, LIMITS AND PROTOCOL MECHANISMS**A.3.1. SUPPORT OF FUNCTIONAL UNITS**

Table 2 - SUPPORT OF FUNCTIONAL UNITS

ITEM #	FUNCTIONAL UNITS	ISO/IEC 10026-4			PROFILES						NOTES
		AS	CP	UP	11	21	31	12	22	32	
1	Dialogue	M	M	M	M	M	M	M	M	M	
2	Shared Control	O.n	O.n	O.n	NA	NA	NA	M	M	M	
3	Polarized Control	O.n	O.n	O.n	M	M	M	NA	NA	NA	
4	Handshake	O	O	O	M	M	M	O	O	O	
5	Commit	NA	M	M	NA	M	M	NA	M	M	
6	Chained Transactions	NA	M	NA	NA	NA	M	NA	NA	M	
7	Unchained Transactions	NA	NA	M	NA	M	NA	NA	M	NA	
8	Recovery	NA	M	M	NA	M	M	NA	M	M	

A.3.2. PROTOCOL MECHANISMS IMPLEMENTED**A.3.2.1. CONCATENATION/SEPARATION**

Table 3 - SUPPORT FOR CONCATENATION/SEPARATION

ITEM #	ROLE	ISO/IEC 10026-4	PROFILES						
			11	21	31	12	22	32	NOTES
1	Concatenation	O	O	O	O	O	O	O	
2	Separation	M	M	M	M	M	M	M	

A.3.2.2. ASSOCIATION ESTABLISHMENT

Table 4 - ASSOCIATION ESTABLISHMENT

ITEM #	ROLE	ISO/IEC 10026-4	PROFILES						
			11	21	31	12	22	32	NOTES
1	Initiator	C	O	M	M	O	M	M	1,2,4
2	Acceptor	C	O	M	M	O	M	M	1,3,4
3	Rejector	O	M	M	M	M	M	M	5,6

NOTES

- 1 When the commitment is supported, then the implementation must be able to support both the association initiator and acceptor role in order to be able to perform recovery adequately.
- 2 The initiator role here implies being capable of issuing an A-ASSOCIATE request and being capable of receiving an A-ASSOCIATE confirm.
- 3 The Acceptor role here implies being capable of receiving an A-ASSOCIATE indication and being capable of issuing an A-ASSOCIATE response with a positive answer.
- 4 For Profiles 11 and 12, at a minimum, the association establishment initiator role or the association establishment acceptor role shall be supported.
- 5 The Rejector role here implies being capable of receiving an A-ASSOCIATE indication and being capable of issuing an A-ASSOCIATE response with a negative answer.
- 6 Although it is mandatory to be able to reject an association, note that in some particular environments it could occur that the reject is always performed by some lower protocol machine (e.g. ACSE).

A.3.2.3. SUPPORT FOR MANDATORY AND OPTIONAL BIDDING

Table 5 - SUPPORT FOR MANDATORY AND OPTIONAL BIDDING

ITEM #	ROLE	ISO/IEC 10026-4	PROFILES						
			11	21	31	12	22	32	NOTES
1	Initiator with Bid mandatory	C	C100	M	M	C100	M	M	
2	Initiator with Bid optional	C	C101	O	O	C101	O	O	
3	Responder with Bid mandatory	C	C102	M	M	C102	M	M	
4	Responder with Bid optional	C	C103	M	M	C103	M	M	

100 If the Initiator of an association role is supported(A.3.2.2/1) then O else NA.

101 If the initiator of the association role is supported (A.3.2.2/1) then M else NA.

102 If the Acceptor of an Association role is supported(A.3.2.2/2) then O else NA.

103 If the Acceptor of an Association role is supported(A.3.2.2/2) then M else NA.

A.3.2.4. CONTENTION

Table 6 - SUPPORT FOR CONTENTION MANAGEMENT

ITEM #	ROLE	ISO/IEC 10026-4	PROFILES						
			11	21	31	12	22	32	NOTES
1	Contention Winner	O.n	O	M	M	O	M	M	1,2
2	Contention Loser	O.n	O	M	M	O	M	M	1,2

NOTES

- When the commitment is supported, in order to enable channel establishment (initiator or acceptor) to be accepted, it is required to be able to support both the contention winner and contention loser roles.
- For profiles 11 and 12, at least one of the contention winner and contention loser roles shall be supported.

A.3.2.5. BID MECHANISM**Table 7 - SUPPORT FOR THE BID MECHANISM**

ITEM #	ROLE	ISO/IEC 10026-4	PROFILES						
			11	21	31	12	22	32	NOTES
1	Initiator	C	C105	M	M	C105	M	M	1,3
2	Responder	C	C106	M	M	C106	M	M	2,3

105 If the Contention Loser role is supported (A.3.2.4/2) then
 If Associations with Bid Mandatory are supported (A.3.2.3/1 or A.3.2.3/3)
 then M else O
 else NA

106 If the Contention Winner role is supported (A.3.2.4/1) then M else NA

NOTES

1. The initiator role here implies being capable of sending a TP-BID-RI APDU and being capable of receiving a TP-BID-RC APDU.
2. The responder role here implies being capable of receiving a TP-BID-RI APDU and being capable of sending a TP-BID-RC APDU with a positive answer.
3. When the commitment is supported, in order to enable channel establishment (initiator and acceptor) to be accepted, it is required to be able to support both the bid initiator and bid responder roles.

A.3.2.6. DIALOGUE ESTABLISHMENT**Table 8 - TP DIALOGUE ESTABLISHMENT**

ITEM #	ROLE	ISO/IEC 10026-4	PROFILES						
			11	21	31	12	22	32	NOTES
1	Initiator	O.n	O	O	O	O	O	O	1,3
2	Acceptor	O.n	O	O	O	O	O	O	2,3
3	Rejector	M	M	M	M	M	M	M	

NOTES

1. The initiator role here implies being capable of sending a TP-BEGIN-DIALOGUE-RI APDU and being capable of receiving a TP-BEGIN-DIALOGUE-RC APDU.

2. The Acceptor role here implies being capable of receiving a TP-BEGIN-DIALOGUE-RI APDU and being capable of sending a TP-BEGIN-DIALOGUE-RC APDU with a positive answer.
3. For each of the profiles, at least one of the Acceptor or initiator roles shall be implemented.

A.3.2.7. TRANSACTION BRANCH ESTABLISHMENT

Table 9 - TRANSACTION BRANCH ESTABLISHMENT

ITEM #	ROLE	ISO/IEC 10026-4	PROFILES						
			11	21	31	12	22	32	NOTES
1	Initiator	C	NA	C107	C107	NA	C107	C107	
2	Acceptor	C	NA	C108	C108	NA	C108	C108	

107 If the implementation is capable of initiating a dialogue (A.3.2.6/1) then M else NA.

108 If the implementation is capable of accepting a dialogue (A.3.2.6/2) then M else NA.

A.3.2.8. ROLES IN A TRANSACTION TREE SUPPORTED

Table 10 - ROLES IN A TRANSACTION TREE SUPPORTED

ITEM #	ROLE	ISO/IEC 10026-4	PROFILES						
			11	21	31	12	22	32	NOTES
1	Root Node	C	NA	O	O	NA	O	O	1
2	Intermediate Node	C	NA	O	O	NA	O	O	1
3	Leaf Node	C	NA	C109	C109	NA	C109	C109	1

109 If capable of acting as an intermediate node then M else O.

NOTES

1. An implementation must be capable of acting as either a root, an intermediate or a leaf node.

A.3.2.9. SUPPORT FOR RECOVERY

This clause does not apply to profiles 11 and 12.

Table 11 - SUPPORT FOR RECOVERY

ITEM #	ROLE	ISO/IEC 10026-4	PROFILES						
			11	21	31	12	22	32	NOTES
1	One-Way recovery	M	NA	M	M	NA	M	M	
2	Two-Way Recovery	O	NA	O	O	NA	O	O	

A.4. TP PROTOCOL - GENERAL

The clause A.4 in ISO/IEC 10026-4 is not relevant.

A.5. TP PROTOCOL - SUPPORT OF THE DIALOGUE FUNCTIONAL UNIT

A.5.1. DIALOGUE FU APDUS

Table 12 - TP APDUS FOR THE DIALOGUE FU

ITEM #	PROTOCOL DATA UNIT	ISO/IEC 10026-4	PROFILES						
			11	21	31	12	22	32	NOTES
1	TP-BEGIN-DIALOGUE-RI	C	C107/ M	C107/ M	C107/ M	C107/ M	C107/ M	C107/ M	1
2	TP-BEGIN-DIALOGUE-RC	C	M/ C107	M/ C107	M/ C107	M/ C107	M/ C107	M/ C107	2
3	TP-END-DIALOGUE-RI	C	M	M	NA	M	M	NA	
4	TP-END-DIALOGUE-RC	C	M	M	NA	M	M	NA	
5	TP-U-ERROR-RI	M	M	M	M	M	M	M	
6	TP-ABORT-RI	M	M	M	M	M	M	M	
7	TP-BID-RI	C	C111/ C110	M	M	C111/ C110	M	M	
8	TP-BID-RC	C	C110/ C111	M	M	C110/ C111	M	M	
9	TP-INITIALIZE-RI	C	C112/ M	M	M	C112/ M	M	M	3
10	TP-INITIALIZE-RC	C	M/ C112	M	M	M/ C112	M	M	4

110 If the implementation is capable of receiving a Bid (A.3.2.5/2) then M else NA

111 If the implementation is capable of initiating a Bid (A.3.2.5/1) then M else NA

112 If the implementation is capable of initiating an association (A.3.2.2/1) then M else NA

NOTES

- It is mandatory for every implementation to receive and recognize the TP-BEGIN-DIALOGUE-RI APDU (ref ISO/IEC 10026-3 13.1.2.1.c and 13.1.2.1.f).

2. It is mandatory for every implementation to be capable of rejecting a TP-BEGIN-DIALOGUE-RI (ref ISO/IEC 10026-3 13.1.2.1f).
3. It is mandatory for every implementation to receive and recognize the TP-INITIALIZE-RI APDU (ref ISO/IEC 10026-3 13.1.2.1.a).
4. It is mandatory for every implementation to be capable of rejecting a TP-INITIALIZE-RI APDU.

A.5.2. TP-BEGIN-DIALOGUE-RI APDU

A.5.2.1. DETAIL OF THE DIALOGUE FIELD OF TP-BEGIN-DIALOGUE-RI APDU

Table 13 - TP-BEGIN-DIALOGUE-RI for Dialogue

ITEM #	ISO/IEC 10026-4		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Initiating-TPSU-Title	O/M		M	See Table 14	
2	Recipient-TPSU-Title	O/M		M	See Table 14	
3	Functional-Units	D	11	M	{0,4}	
			12	M	{1} OR {1,4}	
			21	M	{0,3,4}	
			22	M	{1,3} or {1,3,4}	
			31	M	{0,2,4}	
			32	M	{1,2} or {1,2,4}	
4	Begin-Transaction	C	11,12,31,32	NA		
			21,22	M		
5	Confirmation	D		M		
6	Correlator	M		M	0..2**31-1	
7	Last-Partner-Identifier	O/M		M	0..2**31-1	1
8	User-Data	O/M		M	0..10K octets+	2

NOTES

1. The Last-Partner-Identifier is marked M because an implementation shall be able to support more than one dialogue or channel on an association.
2. The receiver shall be capable of receiving at least 10K octets of user-data.

A.5.2.1.1. DETAIL OF TPSU-TITLE FIELDS FOR THE DIALOGUE FIELD OF TP-BEGIN-DIALOGUE-RI APDU

Table 14 - Detail of TPSU-TITLE fields for the dialogue field of TP-BEGIN-DIALOGUE-RI APDU

ITEM #	ISO/IEC 10026-4		PROFILE			
	TYPE	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	T61String	O..n/M		C113/M	1..64 octets	1
2	PrintableString	O..n/M		C113/M	1..64 octets	1
3	INTEGER	O..n/M		C113/M	0..2**31-1	1

113 If the TPSU-TITLE is used to carry a RECIPIENT-TPSU-TITLE value then M else O

NOTES

- At least one of the three types shall be supported for the INITIATING-TPSU-TITLE.

A.5.3. TP-BEGIN-DIALOGUE-RC APDU

A.5.3.1. DETAIL OF THE DIALOGUE FIELD OF TP-BEGIN-DIALOGUE-RC APDU

Table 15 - TP-BEGIN-DIALOGUE-RC for Dialogue

ITEM #	ISO/IEC 10026-4		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Functional-Units	O/M		M		
2	Result	D		M		
3	Diagnostic	M		M		
4	Correlator	M		M	0..2**31-1	
5	User-Data	O/M		M	0..10K octets+	1

NOTES

- The receiver shall be capable of receiving at least 10K octets of user-data

A.5.4. TP-END-DIALOGUE-RI APDU

This APDU does not apply to profiles 31 and 32.

Table 16 - TP-END-DIALOGUE-RI for Dialogue

ITEM #	ISO/IEC 10026-4		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Confirmation	D	11,12,21,22	M		

A.5.5. TP-ABORT-RI APDU

A.5.5.1. DETAIL OF THE USER FIELD OF TP-ABORT-RI APDU

Table 17 - TP-ABORT-RI, for user

ITEM #	ISO/IEC 10026-4		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	User-Data	O/M		M	0..10K octets +	1

NOTE

1. The receiver shall be capable of receiving at least 10K octets of user-data

A.5.5.2. DETAIL OF THE PROVIDER FIELD OF TP-ABORT-RI APDU

Table 18 - TP-ABORT-RI, for provider

ITEM #	ISO/IEC 10026-4		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Provider-diagnostic	M		M		

A.5.5.3. TP-BID-RI APDU

Table 19 - TP-BID-RI

ITEM #	ISO/IEC 10026-4		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	CCR-Token-Requested	D	11,12	M	False	
			21,22,31,32	M		
2	Last-Partner-Identifier	O/M		M	0..2**31-1	

A.5.6. TP-BID-RC APDU

Table 20 - TP-BID-RC

ITEM #	ISO/IEC 10026-4		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Result	D		M		

A.5.7. TP-INITIALIZE-RI APDU

Table 21 - TP-INITIALIZE-RI

ITEM #	ISO/IEC 10026-4		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Protocol-Version	D		M	(version 1)	
2	Contention-Winner-Assignment	D		M		
3	Bid-Mandatory	D		M		
4	Recovery-Context-Handle	C	11,12	I		
			21,22,31,32	O/M	1..64 octets	1

NOTES

- 1 It is optional to send a RECOVERY-CONTEXT-HANDLE (RCH) as the sender may have no use for it. It is mandatory to receive an RCH and be able to send it on the TP-RECOVER-RI APDU.

A.5.8. TP-INITIALIZE-RC APDU

Table 22 - TP-INITIALIZE-RC

ITEM #	ISO/IEC 10026-4		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Protocol-Version	D		M	(version 1)	
2	Recovery-Context-Handle	O/M	11,12	I		
			21,22,31,32	O/M	1..64 octets	1
3	Diagnostic	O/M		M		

NOTES

- 1 It is optional to send a Recovery-Context-Handle (RCH) as the sender may have no use for it. It is mandatory to receive an RCH and be able to send it on the TP-RECOVER-RI APDU.

A.6. SUPPORT OF THE SHARED CONTROL FUNCTIONAL UNIT

A.6.1. SHARED CONTROL FUNCTIONAL UNIT APDUS

This clause does not apply to profiles 11, 21 and 31.

Table 23 - TP APDUs for the SHARED Control FU

ITEM #	PROTOCOL DATA UNITS	ISO/IEC 10026-4	PROFILES						
			11	21	31	12	22	32	NOTES
1	TP-U-ERROR-RC	M	NA	NA	NA	M	M	M	

A.7. SUPPORT OF THE POLARIZED CONTROL FUNCTIONAL UNIT

This clause does not apply to profiles 12, 22 and 32..

A.7.1. POLARIZED CONTROL FUNCTIONAL UNIT APDUS

Table 24 - TP APDUs for the Polarized Control FU

ITEM #	PROTOCOL DATA UNITS	ISO/IEC 10026-4	PROFILES						
			11	21	31	12	22	32	NOTES
1	TP-GRANT-CONTROL-RI	M	M	M	M	NA	NA	NA	
2	TP-REQUEST-CONTROL-RI	M	M	M	M	NA	NA	NA	

A.8. SUPPORT OF THE HANDSHAKE FUNCTIONAL UNIT

This clause applies to all profiles.

A.8.1. HANDSHAKE FUNCTIONAL UNIT APDUS

Table 25 - TP APDUs for the Handshake FU

ITEM #	PROTOCOL DATA UNITS	ISO/IEC 10026-4	PROFILES						
			11	21	31	12	22	32	NOTES
1	TP-HANDSHAKE-RI	M	M	M	M	C114	C114	C114	
2	TP-HANDSHAKE-RC	M	M	M	M	C114	C114	C114	
3	TP-HANDSHAKE-AND-GRANT- CONTROL-RI	C	M	M	M	NA	NA	NA	
4	TP-HANDSHAKE-AND-GRANT- CONTROL-RC	C	M	M	M	NA	NA	NA	

114 If the Handshake FU is implemented (A.3.1/4) then M else NA

A.8.2. TP-HANDSHAKE-RI APDU

This APDU is not applicable for profiles 12, 22 and 32 when the handshake FU is not implemented.

Table 26 - TP-HANDSHAKE-RI

ITEM #	ISO/IEC 10026-4		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Confirmation-Urgency	C	11,21,31	NA		
			12,22,32	M		

A.8.3. TP-HANDSHAKE-AND-GRANT-CONTROL-RI APDU

This APDU does not apply to profiles 12, 22 and 32.

Table 27 - TP-HANDSHAKE-AND-GRANT-CONTROL-RI

ITEM #	ISO/IEC 10026-4		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Confirmation-Urgency	D	11,21,31	M		

A.9. TP PROTOCOL - SUPPORT OF THE COMMIT FUNCTIONAL UNIT

This clause applies only to profiles 21, 22, 31 and 32.

A.9.1. COMMIT FUNCTIONAL UNIT APDUS

Table 28 - TP APDUs for Commit FU

ITEM #	PROTOCOL DATA UNITS	ISO/IEC 10026-4	PROFILES						
			11	21	31	12	22	32	NOTES
1	TP-PREPARE-RI	C	NA	C115 /C116	C115 /C116	NA	C115 /C116	C115 /C116	
2	TP-DEFER-RI	C	NA	C115 /C116	C115 /C116	NA	C115 /C116	C115 /C116	
3	TP-HEURISTIC-REPORT-RI	C	NA	C116 /C115	C116 /C115	NA	C116 /C115	C116 /C115	
4	TP-TOKEN-GIVE-RI	M	NA	M	M	NA	M	M	

115 If the implementation is capable of initiating a dialogue (A.3.2.6/1) then M else NA

116 If the implementation is capable of accepting a dialogue (A.3.2.6/2) then M else NA

A.9.1.1. TP-PREPARE-RI APDU

This APDU does not apply to profiles 11 and 12.

Table 29 - TP-PREPARE-RI

ITEM #	ISO/IEC 10026-4		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Data-Permitted	C	21,31	M		
			22,32	NA		

A.9.2. TP-DEFER-RI APDU

This APDU does not apply to profiles 11 and 12.

Table 30 - TP-DEFER-RI

ITEM #	ISO/IEC 10026-4		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Type	D	22,32	M	End-Dialogue	
			21,31	M		

A.9.3. TP-HEURISTIC-REPORT-RI APDU

This APDU does not apply to profiles 11 and 12.

Table 31 - TP-HEURISTIC-REPORT-RI

ITEM #	ISO/IEC 10026-4		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Heuristic-Report	D		M		

A.9.4. TP-TOKEN-GIVE-RI APDU

This APDU does not apply to profiles 11 and 12.

Table 32 - TP-TOKEN-GIVE-RI

ITEM #	ISO/IEC 10026-4		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Reason	D		M	Regular, Keep	
2	Correlator	M		M		

A.10. TP PROTOCOL - SUPPORT OF THE RECOVERY FUNCTIONAL UNIT

This clause applies only to profiles 21, 22, 31 and 32.

A.10.1. RECOVERY FUNCTIONAL UNIT APDUS

Table 33 - TP APDUs for Recovery FU

ITEM #	PROTOCOL DATA UNITS	ISO/IEC 10026-4	ATP11	ATP21	ATP31	ATP12	ATP22	ATP32	NOTES
1	TP-BEGIN-DIALOGUE-RI	M	NA	M	M	NA	M	M	1
2	TP-BEGIN-DIALOGUE-RC	M	NA	M	M	NA	M	M	1
3	TP-BID-RI	C	NA	M	M	NA	M	M	1
4	TP-BID-RC	C	NA	M	M	NA	M	M	1,3
5	TP-RECOVER-RI	M/C	NA	M /C117	M /C117	NA	M /C117	M /C117	
6	TP-END-DIALOGUE-RI	M	NA	M	M	NA	M	M	
7	TP-TOKEN-PLEASE-RI	C	NA	C118	C118	NA	C118	C118	3
8	TP-INITIALIZE-RI	M	NA	M	M	NA	M	M	3
9	TP-INITIALIZE-RC	M	NA	M	M	NA	M	M	3
10	TP-TOKEN-GIVE-RI		NA	O	O	NA	O	O	2

117 If the recovery-context-handle field (A.5.7/4, A.5.8/2) is supported in the TP-INITIALIZE-RC and TP-INITIALIZE-RI APDUs then M else NA

118 If Two-Way recovery (A.3.2.9) is supported then M, else NA

NOTES

- When the commitment is supported, in order to enable channel establishment (initiator or acceptor) to be accepted, it is required to be able to support both the bid initiator and the bid responder roles.
- This PDU is not in the Recovery FU in ISO/IEC 10026-4. However it has been added to this ISP as required for support of Two-Way recovery.
- This APDU is specified in clause A.5.

A.10.2. TP-BEGIN-DIALOGUE-RI APDU

A.10.2.1. DETAIL OF THE CHANNEL FIELD OF TP-BEGIN-DIALOGUE-RI APDU

This table does not apply to profiles 11 and 12.

Table 34 - TP-BEGIN-DIALOGUE-RI (Recovery FU)

ITEM #	ISO/IEC 10026-4		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Functional-Units	D		M	{5}	
2	Correlator	M		M	0..2**31-1	
3	Channel-Utilization	D		M	one-way-recovery	
				O	two-way-recovery	
4	Last-Partner-Identifier	O/M		M		

A.10.3. TP-BEGIN-DIALOGUE-RC APDU

A.10.3.1. DETAIL OF THE CHANNEL FIELD OF TP-BEGIN-DIALOGUE-RC APDU

This table does not apply to profiles 11 and 12.

Table 35 - TP-BEGIN-DIALOGUE-RC (Recovery FU)

ITEM #	ISO/IEC 10026-4		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Result	D		M		
2	Diagnostic	M		M		
3	Correlator	M		M	0..2**31-1	

A.10.4. TP-END-DIALOGUE-RI APDU

This table does not apply to profiles 11 and 12.

Table 36 - TP-END-DIALOGUE-RI (Recovery FU)

ITEM #	ISO/IEC 10026-4		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Confirmation	D		M	False	

A.10.5. TP-BID-RI APDU

This table does not apply to profiles 11 and 12.

Table 37 - TP-BID-RI (Recovery FU)

ITEM #	ISO/IEC 10026-4		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	CCR-Tokens-Requested	M		M		
2	Last-Partner-Identifier	O/M		M	0..2**31-1	

A.10.6. TP-RECOVER-RI APDU

This APDU does not apply to profiles 11 and 12.

Table 38 - TP-RECOVER-RI APDU

ITEM #	ISO/IEC 10026-4		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Recovery-Context-Handle	M		M	1..64 octets	

A.10.7. TP-TOKEN-GIVE-RI APDU

Table 39 - TP-TOKEN-GIVE-RI

ITEM #	ISO/IEC 10026-4		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Reason	D		M	Two-Way-recovery	
2	Correlator	C		M		

NOTES

This table is not in ISO/IEC 10026-4. However it has been added to this ISP as required for support of Two-Way recovery.

TITLE: WORKING DOCUMENT FOR

Information Technology - Open Systems Interconnection - International Standardized Profile
12061-3: OSI TP

Part 3: Support of the CCR Protocol.

SOURCE: Joint AOW / EWOS / OIW on Transaction Processing .

DATE: September 25, 1992

STATUS: This document has been produced during the second AOW/EWOS/OIW joint meeting on Transaction Processing (Brussels - June 23-26, 1992). Its content is considered by the three experts groups as harmonized, and all issues have been resolved. The OIW, formally, considers this document to be harmonized with all issues resolved and will submit it to ISO/IEC JTC1/SGFS when the document is approved by the other workshop plenaries. The final document is expected to be submitted to ISO/IEC JTC1/SGFS by November 1992.

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INTRODUCTION

- 1. SCOPE**
- 2. NORMATIVE REFERENCES**
- 3. DEFINITIONS and ABBREVIATIONS**
- 4. NOTATION**
- 5. SUPPORT OF OSI CCR PROTOCOL**
- 6. CONFORMANCE**

ANNEX

- A. SUPPORT OF THE CCR PROTOCOL (NORMATIVE).**

Introduction

The aim of Open Systems Interconnection is to allow, with a minimum of technical agreement outside the interconnection standards, the interconnection of computer systems

- a. from different manufacturers,
- b. under different management,
- c. of different levels of complexity,
- d. of different technologies.

Transaction Processing is concerned with identifiable information which can be related as transactions, which may involve two or more Open Systems. In the framework of Open Systems Interconnection (OSI) a transaction is defined as "a set of related operations characterized by four properties: atomicity, consistency, isolation and durability."

The definition highlights that a distributed transaction is more than a simple exchange of messages, but that the exchanges form a protected indivisible set.

This multi-part document contains the complete specification of the six profiles identified in M-IT-02 and TR 10000.

Part 1 contains the taxonomy for the OSI TP profiles.

Part 2 contains the specification of the support of OSI TP APDUs for each of the profiles specified in Parts 5 to 10.

Part 3 contains the specification of the support of the CCR APDUs for each of the profiles specified in Part 5 to 10.

Part 4 contains the specification of the support of ACSE, Presentation and Session APDUs for each of the profiles specified in Part 5 to 10.

Parts 5 to 10 specify the six profiles which are defined, based on the OSI TP standard. These six parts make reference to Parts 2 to 4.

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**Information Technology - Open Systems Interconnection -
International Standardized Profile 12061-3: OSI Distributed
Transaction Processing.**

Part 3: Support of CCR APDUs

1. SCOPE

This part of this ISP specifies the status for the support of the CCR protocol for the profiles identified in Part 1 of this ISP.

2. NORMATIVE REFERENCES

The references listed in Part 1 of this ISP applies.

3. DEFINITIONS AND ABBREVIATIONS

The Definitions and Abbreviations listed in Part 1 of this ISP applies.

4. NOTATION

The notation described in PART 1 of this ISP Applies.

5. SUPPORT OF CCR APDUs

Annex A specifies the support of CCR protocol.

It applies to profiles 21, 22, 31 and 32. It does not apply to profiles 11 and 12.

6. CONFORMANCE

To conform to the OSI CCR protocol used in any of the profiles defined in this ISP, an implementation shall implement, according to the specifications given in ISO/IEC 9805:

- All mandatory features identified in Annex A.
- All selected optional features, as identified in the completed CCR PICS.

ANNEX A: CCR PDU Supports (Normative)

Temporary Editor's Note: This current Annex A is based on a version of the CCR PICS Proforma which is based on Version 1 of the CCR protocol. It is expected that the CCR PICS Proforma will be aligned to Version 2. This part of the OSI TP ISP will be updated accordingly during the DISP ballot period. Would the CCR PICS Proforma not be aligned on time, the necessary material will be inserted in the OSI TP ISP.

A.1 DATE OF STATEMENT

No restrictions applied to clause A.1 of ISO/IEC 9805-2 by this ISP.

A.2 IMPLEMENTATION DETAILS

No restrictions applied to clause A.2 of ISO/IEC 9805-2 by this ISP.

A.3 ISO/IEC 9805-1

The answer shall be "Version 2".

A.4 AMENDMENTS IMPLEMENTED

Table 1 - AMENDMENTS IMPLEMENTED

ITEM #	Amendment	Profiles						
		11	21	31	12	22	32	Notes
1	ISO/IEC 9805-1 Amendment 1	NA	NA	NA	NA	NA	NA	
2	ISO/IEC 9805-1 Amendment 2	NA	M	M	NA	M	M	

A.5 TECHNICAL CORRIGENDA IMPLEMENTED

The answer shall be "None".

At the time of approval of the final text of this ISP no technical corrigenda was approved for ISO/IEC 9805. When this condition changes, the present ISP will be amended.

A.6 GLOBAL STATEMENT OF CONFORMANCE

A.6.1 MANDATORY FEATURES IMPLEMENTED

The answer shall be "Yes".

A.7 INITIATOR/RESPONDER CAPABILITIES

A.7.1 ATOMIC-ACTION-BRANCH ESTABLISHMENT

Table 2 - ATOMIC-ACTION-BRANCH ESTABLISHMENT BY PROFILE

ITEM #	Roles	ISO/IEC 9805-2	Profiles						
			11	21	31	12	22	32	Notes
1	SUPERIOR	O	NA	C101	C101	NA	C101	C101	1
2	SUBORDINATE	O	NA	C102	C102	NA	C102	C102	1
3	MASTER	O	NA	C103	C103	NA	C103	C103	

101 If capable of acting as a root node or intermediate node then M else I.

102 If capable of acting as a leaf node or intermediate node then M else I.

103 If capable of acting as a root node then M else I.

NOTES

1. At least one of the superior or subordinate roles must be implemented.

A.7.2 SUPPORT FOR THE CONCATENATION MECHANISM

Table 3 - SUPPORT FOR THE CONCATENATION MECHANISM

ITEM #	Roles	ISO/IEC 9805-2	Profiles						
			11	21	31	12	22	32	Notes
1	SENDER	O	NA	O	M	NA	O	M	
2	RECEIVER	M	NA	M	M	NA	M	M	

Temporary note The detail of the markings for row 1, sender role may require further study. A draft technical corrigendum to ISO/IEC 9805:1990 adds procedures for the combined use of the C-COMMIT and C-BEGIN services, and the C-ROLLBACK and C-BEGIN services. Support for concatenation for these combined services may not be optional. An issue is that TP makes no use of the C-ROLLBACK and C-BEGIN services. This issue may apply to ISO/IEC DIS 9805-2 (CCR PICS Proforma).

A.7.3 OTHER IMPLEMENTATION CAPABILITIES

No restriction is applied to clause A.7.3 of ISO/IEC 9805-2 by this ISP.

A.8 CCR PROTOCOL - GENERAL

This subclause details TP's requirements of the CCR protocol. The protocol tables described below, except for the CCR PDU Usage by Profile, do not apply to TP profiles 11 and 12.

A.9 CCR PROTOCOL**A.9.1 CCR PDUs**

This table specifies the support level of each PDU with respect to each profile.

Table 4 - CCR PDU USAGE BY PROFILE

ITEM #	Protocol Data Units	ISO/IEC 9805-2	Profiles						
			11	21	31	12	22	32	Notes
1	C-BEGIN-RI	C	NA	C104 /C105	C104 /C105	NA	C104 /C105	C104 /C105	
2	C-BEGIN-RC	O/C	NA	C105 /C104	C105 /C104	NA	C105 /C104	C105 /C104	
3	C-PREPARE-RI	O/C	NA	C104 /C105	C104 /C105	NA	C104 /C105	C104 /C105	
4	C-READY-RI	C	NA	C105 /C104	C105 /C104	NA	C105 /C104	C105 /C104	
5	C-COMMIT-RI	C	NA	C104 /C105	C104 /C105	NA	C104 /C105	C104 /C105	
6	C-COMMIT-RC	C	NA	C105 /C104	C105 /C104	NA	C105 /C104	C105 /C104	
7	C-ROLLBACK-RI	M	NA	M	M	NA	M	M	
8	C-ROLLBACK-RC	M	NA	M	M	NA	M	M	
9	C-RECOVER-RI	M	NA	M	M	NA	M	M	
10	C-RECOVER-RC	M	NA	M	M	NA	M	M	

104. If capable of acting in the role of superior then M, else NA.

105. If capable of acting in the role of subordinate then M, else NA.

A.9.2 C-BEGIN-RI**Table 5 - C-BEGIN-RI**

BASE STANDARD ISO/IEC 9805-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Atomic Action Identifier	M		M	See Table 6	
2	Branchd-Suffix - Octet String	O/M		O/M	1 .. 64 octets	1
	Branch-Suffix - Integer	O/M		O/M	0..2**31-1	1
3	User Data	O/M		NA		

NOTES

1. At least one of these forms must be supported.

9.2.1. ATOMIC-ACTION IDENTIFIER

This clause provides detail about the Atomic-Action Identifier field of the C-BEGIN APDU.

Table 6 - ATOMIC-ACTION IDENTIFIER DETAIL

		Atomic-Action Identifier of the C-BEGIN APDU		PROFILE		
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Master's Name AE-Title-Form 1 (Directory name)	C/M		O/M	1 .. 1024 octets	1,2
	Master's Name AE-Title-Form 2 (Object Id)	C/M		M	1 .. 64 octets	2
2	Atomic Action Id.- Suffix - Octet String	C/M		C106/M	1 .. 64 octets	2
	Atomic Action Id.- Suffix - Integer	C/M		C106/M	0..2**31-1	

106 If only the Master role is supported then at least one form shall be supported, otherwise both forms shall be supported.

NOTES

1. It is optional to be able to generate a Master's name AE-TITLE-FORM-1 (RDN), but it is mandatory to be able to propagate it when received from a superior by an intermediate node
2. The maximum length of the Atomic-Action Identifier shall be 1024 octets for Form 1 (Directory Name) and 64 octets for Form 2 (object ID). This length includes both Master's Name and suffix.

A.9.3 C-BEGIN-RC

Table 7 - C-BEGIN-RC

		ISO/IEC 9805-2		PROFILE		
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	User-data	O/M		NA		

A.9.4 C-PREPARE-RI

Table 8 - C-PREPARE-RI

ISO/IEC 9805-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	User-data	O/M		M		

A.9.5 C-READY-RI

Table 9 - C-READY-RI

ISO/IEC 9805-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	User-data	O/M		NA		

A.9.6 C-COMMIT-RI

Table 10 - C-COMMIT-RI

ISO/IEC 9805-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	User-Data	O/M		M		

A.9.7 C-COMMIT-RC

Table 11 - C-COMMIT-RC

BASE STANDARD ISO/IEC 9805-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	User-data	O/M		M		

A.9.8 C-ROLLBACK-RI

Table 12 - C-ROLLBACK-RI

	ISO/IEC 9805-2		PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
	User-data	O/M		M		

A.9.9 C-ROLLBACK-RC

Table 13 - C-ROLLBACK-RC

	ISO/IEC 9805-2		PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	User-data	O/M		M		

A.9.10 C-RECOVER-RI

Table 14 - C-RECOVER-RI

	BASE STANDARD ISO/IEC 9805-2		PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Atomic Action Identifier	M		M	See Table 15	
2	Branch Identifier	M		M	See Table 16	
3	Recovery State	M		M	See Table 17	
4	User Data	O/M		M		

A.9.10.1. ATOMIC-ACTION IDENTIFIER

This clause provides detail about the Atomic-Action Identifier field of the C-RECOVER RI APDU.

Table 15 - ATOMIC-ACTION IDENTIFIER DETAIL

Atomic-Action Identifier of the C-RECOVER-RI APDU		PROFILE				
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Master's Name AE-Title-Form 1 (Directory name)	C		O/M	1 .. 1024 octets	1
	Master's Name AE-Title-Form 2 (Object Id)	C		M	1 .. 64 octets	1
2	Atomic Action Id.- Suffix - Octet String	C		M	1 .. 64 octets	1
	Atomic Action Id.- Suffix - Integer	C		M	0..2**31-1	

NOTES

1. The maximum length of the Atomic-Action Identifier shall be 1024 octets for Form 1 (Directory Name) and 64 octets for Form 2 (object ID). This length includes both Master's Name and suffix.

A.9.10.2. BRANCH IDENTIFIER

This clause provides detail about the Branch Identifier field of the C-RECOVER RI APDU.

Table 16 - BRANCH IDENTIFIER DETAIL

		Branch Identifier of the C-RECOVER-RI APDU	PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Superior's-Name AE-Title-Form 1 (Directory name)	C		O/M	1 .. 1024 octets	1
	Superior's-Name AE-Title-Form 2 (Object Id)	C		M	1 .. 64 octets	1
2	Branch-- Suffix - Octet String	C		M	1 .. 64 octets	1
	Branch-- Suffix - Integer	C		M	0 .. 2**31-1	

NOTES

1. The maximum length of the Branch Identifier shall be 1024 octets for Form 1 (Directory Name) and 64 octets for Form 2 (object ID). This length includes both Superior's Name and suffix.

A.9.10.3. RECOVERY STATE

This clause provides detail about the RECOVERY-STATE field of the C-RECOVER RI APDU.

Table 17 - RECOVERY-STATE

Recovery-State of the C-RECOVER-RI APDU		PROFILE				
ITEM#	STATE	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Commit	C		C101/C102		
2	Ready	C		C102/C101		

A.9.11 C-RECOVER-RC

Table 18 - C-RECOVER-RC

BASE STANDARD ISO/IEC 9805-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Atomic Action Identifier	M		M	See Table 19	
2	Branch Identifier	M		M	See Table 20	
3	Recovery State	M		M	See Table 21	
4	User Data	O/M		M		

A.9.11.1. ATOMIC-ACTION IDENTIFIER

This clause provides detail about the Atomic-Action Identifier field of the C-RECOVER RC APDU.

Table 19 - ATOMIC-ACTION IDENTIFIER DETAIL

		Atomic-Action Identifier of the C-RECOVER-RC APDU	PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/LV ALLOWED	NOTES
1	Master's Name AE-Title-Form 1 (Directory name)	C		O/M	1 .. 1024 octets	1
	Master's Name AE-Title-Form 2 (Object Id)	C		M	1 .. 64 octets	1
2	Atomic Action Id.- Suffix - Octet String	C		M	1 .. 64 octets	1
	Atomic Action Id.- Suffix - Integer	C		M	0 .. 2**31-1	

NOTES

1. The maximum length of the Atomic Action Identifier shall be 1024 octets for Form 1 (Directory Name) and 64 octets for Form 2 (object ID). This length includes both Master's Name and suffix.

A.9.11.2. BRANCH IDENTIFIER

This clause provides detail about the Branch Identifier field of the C-RECOVER RC APDU.

Table 20 - BRANCH IDENTIFIER DETAIL

ITEM#	Branch Identifier of the C-RECOVER-RC APDU		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/LV ALLOWED	NOTES
1	Superior's-Name AE-Title-Form 1 (Directory name)	C		O/M	1 .. 1024 octets	1
	Superior's-Name AE-Title-Form 2 (Object Id)	C		M	1 .. 64 octets	1
2	Branch-- Suffix - Octet String	C		M	1 .. 64 octets	1
	Branch-- Suffix - Integer	C		M	0 .. 2**31-1	

NOTES

1. The maximum length of the Branch Identifier shall be 1024 octets for Form 1 (Directory Name) and 64 octets for Form 2 (object ID). This length includes both Superior's Name and suffix.

A.9.11.3. RECOVERY STATE

This clause provides detail about the RECOVERY-STATE field of the C-RECOVER RC APDU.

Table 21 - RECOVERY-STATE

ITEM#	Recovery-State of the C-RECOVER-RC APDU		PROFILE			
	STATE	STATUS	PROFILE ID	STATUS	T/LV ALLOWED	NOTES
1	Done	C		C102 /C101		
2	Unknown	C		C101 /C102		
3	Retry-later	M		M		

TITLE: WORKING DOCUMENT FOR

Information Technology - Open Systems Interconnection - International Standardized Profile
12061-4: OSI TP

Part 4: Support of Session, Presentation and ACSE Protocols.

SOURCE: Joint AOW / EWOS / OIW on Transaction Processing

DATE: September 25, 1992

STATUS: This document has been produced during the second AOW/EWOS/OIW joint meeting on Transaction Processing (Brussels - June 23-26, 1992). Its content is considered by the three experts groups as harmonized, and all issues have been resolved. The OIW, formally, considers this document to be harmonized with all issues resolved and will submit it to ISO/IEC JTC1/SGFS when the document is approved by the other workshop plenaries. The final document is expected to be submitted to ISO/IEC JTC1/SGFS by November 1992.

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INTRODUCTION

- 1. SCOPE**
- 2. NORMATIVE REFERENCES**
- 3. DEFINITIONS and ABBREVIATIONS**
- 4. NOTATION**
- 5. SUPPORT OF OSI SESSION PROTOCOL**
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ANNEX

- A. SUPPORT OF THE SESSION PROTOCOL (NORMATIVE)**
- B. SUPPORT OF THE PRESENTATION PROTOCOL (NORMATIVE)**
- C. SUPPORT OF THE ACSE PROTOCOL (NORMATIVE).**

INTRODUCTION

The aim of Open Systems Interconnection is to allow, with a minimum of technical agreement outside the interconnection standards, the interconnection of computer systems

- a. from different manufacturers,
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Transaction Processing is concerned with identifiable information which can be related as transactions, which may involve two or more Open Systems. In the framework of Open Systems Interconnection (OSI) a transaction is defined as "a set of related operations characterized by four properties: atomicity, consistency, isolation and durability."

The definition highlights that a distributed transaction is more than a simple exchange of messages, but that the exchanges form a protected indivisible set.

This multi-part document contains the complete specification of the six profiles identified in M-IT-02 and TR 10000.

Part 1 contains the taxonomy for the OSI TP profiles.

Part 2 contains the specification of the support of OSI TP APDUs for each of the profiles specified in Parts 5 to 10.

Part 3 contains the specification of the support of the CCR APDUs for each of the profiles specified in Part 5 to 10.

Part 4 contains the specification of the support of Session , Presentation and ACSEAPDUs for each of the profiles specified in Part 5 to 10.

Parts 5 to 10 specify the six profiles which are defined, based on the OSI TP standard. These six parts make reference to Parts 2 to 4.

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Information Technology - Open Systems Interconnection - International Standardized Profile 12061-4: OSI Distributed Transaction Processing.

Part 4: Support of SESSION, PRESENTATION AND ACSE PDUs

1. SCOPE

This part of this ISP specifies the status for the support of the Session, Presentation and ACSE protocols for the profiles identified in Part 1 of this ISP.

2. NORMATIVE REFERENCES

The references listed in Part 1 of this ISP.

3. DEFINITIONS AND ABBREVIATIONS

The definitions and abbreviations contained in Part 1 of this ISP apply to this part.

4. NOTATION

The notation described in PART 1 of this ISP Applies.

5. SUPPORT OF SESSION SPDUs

Annex A specifies the support of Session protocol.

6. SUPPORT OF PRESENTATION PPDU's

Annex B specifies the support of Presentation protocol.

7. SUPPORT OF ACSE APDU's

Annex C specifies the support of ACSE protocol.

8. CONFORMANCE

To conform to the OSI ACSE protocol used in any of the profiles defined in this ISP, an implementation shall implement, according to the specifications given in ISO/IEC 8650:

- All mandatory features identified in Annex C.

- All selected optional features, as identified in the completed ACSE PICS.
- All restrictions as specified in the Common Upper Layer Requirements
ISP - ISO 11188-1.

To conform to the OSI Presentation protocol used in any of the profiles defined in this ISP, an implementation shall implement, according to the specifications given in ISO/IEC 8823:

- All mandatory features identified in Annex B.
- All selected optional features, as identified in the completed Presentation PICS.
- All restrictions as specified in the Common Upper Layer Requirements
ISP - ISO 11188-1.

To conform to the OSI Session protocol used in any of the profiles defined in this ISP, an implementation shall implement, according to the specifications given in ISO/IEC 8327:

- All mandatory features identified in Annex A.
- All selected optional features, as identified in the completed Session PICS.
- All restrictions as specified in the Common Upper Layer Requirements
ISP - ISO 11188-1.

ANNEX A: Session PROTOCOL PDUs (Normative)

This subclause details TP's requirements on the Session protocol. The reader should consult the Upper Layer agreements for a detailed discussion of these services. This ISP only specifies PDU parameters necessary for this ISP.

A.1 SUPPORTED FUNCTIONS

Table 1 - SUPPORTED FUNCTIONS

ITEM#	BASE STANDARD ISO/IEC 8327-2		PROFILE		
	CAPABILITY	STATUS	PROFILE ID	STATUS	NOTES
1	Kernel	M		M	
2	Negotiated Release	O		*(I)	
3	Half Duplex	O.n		NA	3
4	Duplex	O.n		M	
5	Expedited Data	O		*(I)	
6	Typed Data	O	11,12	*(I)	
			21,22,31,32	M	
7	Capability Data Exchange	C	11,12	*(I)	
			21,22,31,32	NA	3
8	Minor Synchronize	O	11,12	*(I)	
			21,22,31,32	M	
9	Symmetric Synchronize	O	11,12	*(I)	
			21,22,31,32	NA	3
10	Major Synchronize	O		*(I)	
11	Resynchronize	O	11,12	*(I)	
			21,22,31,32	M	
12	Exceptions	C		NA	1,3
13	Activity Management	O	11,12	*(I)	
			21,22,31,32	NA	2,3,
14	Data Separation	C	11,12	*(I)	
			21,22,31,32	M	

NOTES

- Exceptions FU cannot be negotiated because Half Duplex is not allowed.
- Activity Management FU cannot be negotiated for these profiles because the Data Separation FU does not allow the Activity Management FU to also be selected.
- Successfully accepting these functional units is a protocol error. If any of the following Functional Units is proposed on a CN SPDU the Functional Unit shall not be accepted and the corresponding bit shall be set to zero on the Accept SPDU.

A.2 ISO 8327 Protocol Versions Implemented

Table 2 -ISO 8327 PROTOCOL VERSIONS IMPLEMENTED

ITEM#	BASE STANDARD ISO/IEC 8327 -2		PROFILE		
	CAPABILITY	STATUS	PROFILE ID	STATUS	NOTES
1	Version 1	O		I	
2	Version 2	O		M	

A.3 PROTOCOL MECHANISMS

Table 3- PROTOCOL MECHANISMS

ITEM#	ISO/IEC 8327-2		PROFILE		
	CAPABILITY	STATUS	PROFILE ID	STATUS	NOTES
1	Use of Transport Expedited Data	O		O	
2	Reuse of Transport Connection	O		*(I)	
3	Basic Concatenation	M		M	
4	Extended Concatenation	O		I	
5	Segmentation	O		*(I)	
6	Segmentation of Unlimited User Data	O		*(I)	

A.4 INITIATOR/RESPONDER CAPABILITIES

Table 4 - INITIATOR/RESPONDER CAPABILITIES

ITEM#	ISO/IEC 8327-2		PROFILE		
	CAPABILITY	STATUS	PROFILE ID	STATUS	NOTES
1	Initiator	O		C101	
2	Responder	O		M	

101. If capable of initiating an Association then M, else I.

A.5 SESSION PROCEDURES USAGE BY PROFILE

This table specifies the supported level of each Session PDU with respect to each profile.

Table 5 - KERNEL FUNCTIONAL UNIT PROCEDURES USAGE BY PROFILE

ITEM #	Protocol Data Units	ISO/IEC 8327-2	Profiles						
			11	21	31	12	22	32	Notes
1	Connect (CN)	C/C	C103 /M	C103 /M	C103 /M	C103 /M	C103 /M	C103 /M	
2	Overflow Accept(OA)	C	I	I	I	I	I	I	
3	Connect Data Overflow(CDO)	C	I	I	I	I	I	I	
4	Accept(AC)	C/C	C104 /C103	C104 /C103	C104 /C103	C104 /C103	C104 /C103	C104 /C103	
5	Refuse(RF)	C/C	M /C103	M /C103	M /C103	M /C103	M /C103	M /C103	
6	Finish(FN)	O/C	O/M	O/M	O/M	O/M	O/M	O/M	

Table 5 - continued

ITEM #	Protocol Data Units	ISO/IEC 8327-2	Profiles						
			11	21	31	12	22	32	Notes
7	Disconnect(DN)	O	M /C105	M /C105	M /C105	M /C105	M /C105	M /C105	
8	Abort(AB)	M	M	M	M	M	M	M	
9	Abort Accept(AA)	O	C106	C106	C106	C106	C106	C106	
10	Data Transfer(DT)	O/C	M	M	M	M	M	M	
11	Prepare(PR)	C/C	C107	C107	C107	C107	C107	C107	

103. If capable of initiating an Association then M, else I.

104. If capable of responding to a AARQ APDU then M, else I.

105. If capable of initiating a FINISH then M, else NA.

106. If reusing T-Connection then M, else I.

107. If transport expedited available then M, else NA.

Table 6 - NEGOTIATED RELEASE FUNCTIONAL UNIT PROCEDURES USAGE BY PROFILE

ITEM #	Protocol Data Units	ISO/IEC 8327-2	Profiles						
			11	21	31	12	22	32	Notes
1	Not Finished(NF)	O/M	*	*	*	*	*	*	
2	Give Tokens(GT)	O	*	*	*	*	*	*	1
3	Please Tokens(PT)	O/M	*	*	*	*	*	*	1

NOTES

1. These PDUs are marked * in this table because the Negotiated Release FU is marked * in Table 1. These PDUs may be used elsewhere in different ways.

Table 7 - HALF DUPLEX FUNCTIONAL UNIT PROCEDURES USAGE BY PROFILE

ITEM #	Protocol Data Units	ISO/IEC 8327-2	Profiles						
			11	21	31	12	22	32	Notes
1	Give Tokens(GT)	O	NA	NA	NA	NA	NA	NA	1
2	Please Tokens(PT)	O/M	NA	NA	NA	NA	NA	NA	1

NOTES

- These PDUs are marked NA in this table because the Half Duplex FU is marked NA in Table 1. These PDUs may be used elsewhere in different ways.

DUPLEX FUNCTIONAL UNIT PROCEDURES

No additional SPDUs (this clause is present for completeness).

Table 8 - EXPEDITED DATA FUNCTIONAL UNIT PROCEDURES USAGE BY PROFILE

ITEM #	Protocol Data Units	ISO/IEC 8327-2	Profiles						
			11	21	31	12	22	32	Notes
1	Expedited Data(EX)	O/M	*	*	*	*	*	*	

Table 9 - TYPED DATA FUNCTIONAL UNIT PROCEDURES USAGE BY PROFILE

ITEM #	Protocol Data Units	ISO/IEC 8327-2	Profiles						
			11	21	31	12	22	32	Notes
1	Typed Data(TD)	O/M	*	M	M	*	M	M	

Table 10 - CAPABILITY DATA FUNCTIONAL UNIT PROCEDURES USAGE BY PROFILE

ITEM #	Protocol Data Units	ISO/IEC 8327-2	Profiles						
			11	21	31	12	22	32	Notes
1	Capability Data(CD))	O/M	*	NA	NA	*	NA	NA	1
2	Capability Data Ack(CDA)	M/C	*	NA	NA	*	NA	NA	1

NOTES

1. Because the Capability Data FU shall never be selected on a Session Connection for Profiles 21, 22, 31, and 32, the Session Protocol Machine will generate a protocol error when a CD or CDA SPDU is received in these profiles.

Table 11 -MINOR SYNCHRONIZE FUNCTIONAL UNIT PROCEDURES USAGE BY PROFILE

ITEM #	Protocol Data Units	ISO/IEC 8327-2	Profiles						
			11	21	31	12	22	32	Notes
1	Minor Sync Point(MIP)	O	*	M	M	*	M	M	
2	Minor Sync Point Ack(MIA)	O/C	*	M	M	*	M	M	
3	Give Tokens(GT)	O	*	M	M	*	M	M	
4	Please Tokens(PT)	O/M	*	M	M	*	M	M	

Table 12 -SYMMETRIC SYNCHRONIZE FUNCTIONAL UNIT PROCEDURES USAGE BY PROFILE

ITEM #	Protocol Data Units	ISO/IEC 8327-2	Profiles						
			11	21	31	12	22	32	Notes
1	Minor Sync Point(MIP)	O	*	NA	NA	*	NA	NA	1
2	Minor Sync Point Ack(MIA)	O/C	*	NA	NA	*	NA	NA	1

NOTES

1. Because the Symmetric Synchronize FU shall never be selected on a Session Connection for Profiles 21, 22, 31, and 32, the MIP and MIA SPDUs have been marked NA. They may be used differently elsewhere.

Table 13 -MAJOR SYNCHRONIZE FUNCTIONAL UNIT PROCEDURES USAGE BY PROFILE

ITEM #	Protocol Data Units	ISO/IEC 8327-2	Profiles						
			11	21	31	12	22	32	Notes
1	Major Sync Point(MAP)	O/M	*	*	*	*	*	*	
2	Major Sync Point Ack(MAA)	M/C	*	*	*	*	*	*	
3	Give Tokens(GT)	O	*	*	*	*	*	*	1
4	Please Tokens(PT)	O/M	*	*	*	*	*	*	1
5	Prepare(PR)	C/C	*	*	*	*	*	*	1

NOTES

1. Because the Major Synchronize FU has been marked * in Table 1, these PDUs have been marked *. They may be used differently elsewhere.

Table 14 -RESYNCHRONIZE FUNCTIONAL UNIT PROCEDURES USAGE BY PROFILE

ITEM #	Protocol Data Units	ISO/IEC 8327-2	Profiles						
			11	21	31	12	22	32	Notes
1	RESYNCHRONIZE(RS)	O/M	*	M	M	*	M	M	1
2	RESYNCHRONIZE Ack(RA)	M/C	*	M	M	*	M	M	1
3	Prepare(PR)	C/C	*	C107	C107	*	C107	C107	1

NOTES

1. Because the ReSynchronize FU has been marked in Table 1 with * for Profiles 11 and 12 these PDUs have been marked with * in this table. They may be used differently elsewhere.

Table 15 -EXCEPTIONS FUNCTIONAL UNIT PROCEDURES USAGE BY PROFILE

ITEM #	Protocol Data Units	ISO/IEC 8327-2	Profiles						
			11	21	31	12	22	32	Notes
1	Exception Report(ER)	O/M	NA	NA	NA	NA	NA	NA	1
2	Exception Data(ED)	O/M	NA	NA	NA	NA	NA	NA	1

NOTES

1. Because the ExceptionFU shall never be selected for a Session Connection, the Session Protocol Machine will generate a protocol error when an ER or ED SPDU is received.

Table 16 -ACTIVITY MANAGEMENT FUNCTIONAL UNIT PROCEDURES USAGE BY PROFILE

ITEM #	Protocol Data Units	ISO/IEC 8327-2	Profiles						
			11	21	31	12	22	32	Notes
1	Activity Start(AS)	O/M	*	NA	NA	*	NA	NA	2
2	Activity Resume(AR)	O/M	*	NA	NA	*	NA	NA	2
3	Activity Interrupt(AI)	O/M	*	NA	NA	*	NA	NA	2
4	Activity Interrupt Ack(AIA)	M/C	*	NA	NA	*	NA	NA	2
5	Activity Discard(AD)	O/M	*	NA	NA	*	NA	NA	2
6	Activity Discard Ack(ADA)	M/C	*	NA	NA	*	NA	NA	2
7	Activity End(AE)	O/M	*	NA	NA	*	NA	NA	2
8	Activity End Ack(AEA)	M/C	*	NA	NA	*	NA	NA	2
9	Prepare(PR)	C/C	*	NA	NA	*	NA	NA	2,3
10	Give Tokens(GT)	O	*	NA	NA	*	NA	NA	2,3
11	Please Tokens(PT)	O/M	*	NA	NA	*	NA	NA	2,3
12	Give Tokens Confirm(GTC)	O/M	*	NA	NA	*	NA	NA	1,2
13	Give Tokens Confirm Ack(GTA)	O/M	*	NA	NA	*	NA	NA	1,2

NOTES

1. The Give tokens confirm and Ack are a result of the control give service and require the activity management FU.
2. Because the Activity Management FU shall never be selected on a Session connection for profiles 21, 22, 31 and 32, the Session Protocol Machine will generate a protocol error when the SPDU is received in these Profiles.
3. Because the Activity Management FU has been marked in Table 1 with * or NA the PDUs have been marked with * or NA in this table. They may be used differently elsewhere.

A.6 SUPPORTED PARAMETERS OF SESSION PDUs.

A.6.1 CONNECT (CN) SPDU

Table 17 - CONNECT (CN) SPDU

ISO/IEC 8327-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
	PGI Connection Identifier					
1	PGI default (absent)	O/M		I		
2	PGI default (empty)	O/M		I		
3	Calling SS-User Reference	O/M		I		
4	Common Reference	O/M		I		
5	Additional Reference Info	O/M		I		
	PGI Connect/Accept Item					
6	PGI default (absent)	O/M		I		
7	PGI default (empty)	O/M		I		
8	PGI default (not empty)	O/M		M		
9	Protocol Options	C/M		I/M		
10	TSDU-Maximum-size	O/M		I/M		
11	Version Number	O/M		M	Version 2	
12	Initial Serial Number	O/M	11,12	*		
			21,22,31,32	M		
13	Token Setting Item	O/M	11,12	*		
			21,22,31,32	M		
14	Second Initial Serial Number	C/C	11,12	C108		
			21,22,31,32	I		1

Table 17 - continued

ITEM#	ISO/IEC 8327-2		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
	Single Items					
15	Session User Requirements	O/M		M		
16	Calling Session Selector	O/M		M		
17	Called Session Selector	O/M		M		
18	PGI "User Data"	O/M		M		
19	Data Overflow	C/C		I		
20	PGI "Extended User Data"	C/C		M		

108. If Symmetric-Sync supported then O else I.

NOTES

1. Because the Symmetric Synchronize FU shall never be selected for a Session connection for Profiles 21, 22, 31 and 32, the Session Protocol machine will ignore the Second Initial Serial Number parameter if it is present on a CN SPDU in Profiles 21, 22, 31, and 32.

A.6.2 OVERFLOW ACCEPT (OA) SPDU

This SPDU is not used by TP. Its use by a U-ASE is not specified by this ISP.

A.6.3 CONNECT DATA OVERFLOW (CDO) SPDU

This SPDU is not used by TP. Its use by a U-ASE is not specified by this ISP.

A.6.4 ACCEPT (AC) SPDU

Table 18 - ACCEPT(AC) SPDU

	ISO/IEC 8327-2		PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
	PGI Connection Identifier					
1	PGI default (absent)	O/M		I		
2	PGI default (empty)	O/M		I		
3	Calling SS-User Reference	O/M		I		
4	Common Reference	O/M		I		
5	Additional Reference Info	O/M		I		
	PGI Connect/Accept Item					
6	PGI default (absent)	O/M		NA		1
7	PGI default (empty)	O/M		NA		1
8	PGI default (not empty)	O/M		M		
9	Protocol Options	C/M		I		
10	TSDU-Maximum-size	O/M		I/M		
11	Version Number	C/M		M	Version 2	
12	Initial Serial Number	O/M	11,12	*		
			21,22,31,32	M		
13	Token Setting Item	O/M	11,12	*		
			21,22,31,32	M		
14	Second Initial Serial Number	C/C	11,12	C108		
			21,22,31,32	I		2
	Single Items					
15	Token Item	O/M		O/M		
16	Session User Requirements	O/M		M		
17	Calling Session Selector	O/M		M		
18	Called Session Selector	O/M		M		
19	PGI "User Data"	O/M		M		
20	Enclosure Item	C		*		

NOTES

1. Because Session Version 2 shall be selected, the Session Protocol Machine will generate a protocol error when the PGI Connect/Accept item is absent or empty.
2. Because the Symmetric Synchronize FU shall never be selected for a Session connection for Profiles 21, 22, 31 and 32, the Session Protocol Machine will ignore the Second Initial Serial Number parameter if it is present on an AC SPDU in Profiles 21, 22, 31, and 32.

A.6.5 REFUSE (RF) SPDU

Table 19 - REFUSE (RF) SPDU

ISO/IEC 8327-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	PGI default (empty)	O/M		I		
2	PGI default (not empty)	O/M		I		
3	Called SS-User Reference	O/M		I		
4	Common Reference	O/M		I		
5	Additional Reference Info	O/M		I		
Single Items						
6	Transport Disconnect	O/M		O/M		
9	Session User Requirements	O/M		M		
10	Version Number	O/M		M		
11	Reason Code	O/M		M		
12	Enclosure Item	C		*		

A.6.6 FINISH (FN) SPDU

Table 20 - FINISH (FN) SPDU

ISO/IEC 8327-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Transport Disconnect	O/M		O/M		
2	PGI "User Data"	O/M		M		
3	Enclosure Item	C/C		*		

A.6.7 DISCONNECT (DN) SPDU

Table 21 - DISCONNECT (DN) SPDU

ISO/IEC 8327-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	PGI "User Data"	O/M		M		
2	Enclosure Item	C/C		*		

A.6.8 NOT FINISHED (NF) SPDU

This SPDU is not used by TP. Its use by a U-ASE is not specified by this ISP.

A.6.9 ABORT (AB) SPDU

Table 22 - ABORT (AB) SPDU

ISO/IEC 8327-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Transport Disconnect	M		M		
2	Reflect Parameter Values	O/M		I		
3	PGI "User Data"	O/M		M		
4	Enclosure Item	C/C		*		

A.6.10 ABORT ACCEPT (AA) SPDU

This SPDU is not used by TP. Its use by a U-ASE is not specified by this ISP.

A.6.11 DATA TRANSFER (DT) SPDU

Table 23 - DATA TRANSFER (DT) SPDU

ISO/IEC 8327-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	User Information Field	O/M		M		
2	Enclosure Item	C/C		*		

A.6.12 EXPEDITED DATA (EX) SPDU

This SPDU is not used by TP. Its use by a U-ASE is not specified by this ISP.

A.6.13 TYPED DATA (TD) SPDU

Table 24 - TYPED DATA (TD) SPDU

		ISO/IEC 8327-2		PROFILE		
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Enclosure Item	C/C		*		
2	User Information Field	O/M		M		

A.6.14 CAPABILITY DATA (CD) SPDU

This SPDU is not used by TP. Its use by a U-ASE in profiles 11 and 12 is not specified by this ISP; however, its use by a U-ASE in profiles 21,22,31 and 32 is prohibited

A.6.15 CAPABILITY DATA ACK (CDA) SPDU

This SPDU is not used by TP. Its use by a U-ASE in profiles 11 and 12 is not specified by this ISP; however, its use by a U-ASE in profiles 21,22,31 and 32 is prohibited

A.6.16 GIVE TOKENS (GT) SPDU

This PDU is not used by Profiles 11 and 12.

Table 25 - GIVE TOKENS (GT) SPDU

ISO/IEC 8327-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Token Item	O/M		M	Minor Sync	
				*	Other Tokens	
2	PGI "User Data"	C/C		M		
3	Enclosure Item	C/C		*		

A.6.17 PLEASE TOKENS (PT) SPDU

This PDU is not used by Profiles 11 and 12.

Table 26 - PLEASE TOKENS (PT) SPDU

ISO/IEC 8327-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Token Item	O/M		M	Minor Sync	
				*	Other Tokens	
2	PGI "User Data"	O/M		M		
3	Enclosure Item	C/C		*		

A.6.18 MINOR SYNC POINT (MIP) SPDU

This PDU is not used by Profiles 11 and 12.

Table 27 - MINOR SYNC POINT (MIP) SPDU

ITEM#	ISO/IEC 8327-2		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Sync Type Item	O/M		M		
2	Serial Number	M		M		
3	PGI "User Data"	O/M		M		
4	Enclosure Item	C		M		

A.6.19 MINOR SYNC POINT ACK (MIA) SPDU

This PDU is not used by Profiles 11 and 12.

Table 28 - MINOR SYNC POINT ACK (MIA) SPDU

ITEM#	ISO/IEC 8327-2		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Serial Number	M		M		
2	PGI "User Data"	O/M		M		
3	Enclosure Item	C/C		*		

A.6.20 MAJOR SYNC POINT (MAP) SPDU

This SPDU is not used by TP. Its use by a U-ASE is not specified by this ISP.

A.6.21 MAJOR SYNC POINT ACK (MAA) SPDU

This SPDU is not used by TP. Its use by a U-ASE is not specified by this ISP.

A.6.22 RESYNCHRONIZE (RS) SPDU

This PDU is not used by TP for profiles 11 and 12.

Table 29 - RESYNCHRONIZE (RS) SPDU

ISO/IEC 8327-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Enclosure Item	C		*		
2	Token Setting Item	O/M		M	Minor Sync	
				*	Other Tokens	
3	Resync Type	O/M		M		
4	Serial Number	O/M		M		
5	Second Resync Type	C		I		
6	Second Serial Number	C		I		
7	PGI "User Data"	O/M		M		

A.6.23 RESYNCHRONIZE ACK (RA) SPDU

Table 30 RESYNCHRONIZE ACK (RA) SPDU

This PDU is not used by TP for profiles 11 and 12.

ISO/IEC 8327-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Enclosure Item	C		*		
2	Token Setting Item	O/M	32	M	Minor Sync	
				*	Other Tokens	
3	Resync Type	O/M		I		
4	Serial Number	O/M		M		
5	Second Resync Type	C/C		I		
6	Second Initial Serial Number	C/C		I		
7	PGI "User Data"	O/M		M		

A.6.24 PREPARE (PR) SPDU

Table 31 - PREPARE (PR) SPDU

This PDU is not used by TP for profiles 11 and 12.

ITEM#	ISO/IEC 8327-2		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Prepare Type	M		M		
2	Resync Type	C		I		
3	Second Resync Type	C		I		

A.6.25 EXCEPTION REPORT (ER) SPDU

This SPDU is not used by TP. Its use by a U-ASE is prohibited

A.6.26 EXCEPTION DATA (ED) SPDU

This SPDU is not used by TP. Its use by a U-ASE is prohibited

A.6.27 GIVE TOKENS CONFIRM (GTC) SPDU

This SPDU is not used by TP. Its use by a U-ASE in profiles 11 and 12 is not specified by this ISP; however, its use by a U-ASE in profiles 21,22,31 and 32 is prohibited

A.6.28 GIVE TOKENS CONFIRM ACK (GTA) SPDU

This SPDU is not used by TP. Its use by a U-ASE in profiles 11 and 12 is not specified by this ISP; however, its use by a U-ASE in profiles 21,22,31 and 32 is prohibited

A.6.29 ACTIVITY START (AS) SPDU

This SPDU is not used by TP. Its use by a U-ASE in profiles 11 and 12 is not specified by this ISP; however, its use by a U-ASE in profiles 21,22,31 and 32 is prohibited

A.6.30 ACTIVITY RESUME (AR) SPDU

This SPDU is not used by TP. Its use by a U-ASE in profiles 11 and 12 is not specified by this ISP; however, its use by a U-ASE in profiles 21,22,31 and 32 is prohibited

A.6.31 ACTIVITY INTERRUPT (AI) SPDU

This SPDU is not used by TP. Its use by a U-ASE in profiles 11 and 12 is not specified by this ISP; however, its use by a U-ASE in profiles 21,22,31 and 32 is prohibited

A.6.32 ACTIVITY INTERRUPT ACK (AIA) SPDU

This SPDU is not used by TP. Its use by a U-ASE in profiles 11 and 12 is not specified by this ISP; however, its use by a U-ASE in profiles 21,22,31 and 32 is prohibited

A.6.33 ACTIVITY DISCARD (AD) SPDU

This SPDU is not used by TP. Its use by a U-ASE in profiles 11 and 12 is not specified by this ISP; however, its use by a U-ASE in profiles 21,22,31 and 32 is prohibited

A.6.34 ACTIVITY DISCARD ACK (ADA) SPDU

This SPDU is not used by TP. Its use by a U-ASE in profiles 11 and 12 is not specified by this ISP; however, its use by a U-ASE in profiles 21,22,31 and 32 is prohibited

A.6.35 ACTIVITY END (AE) SPDU

This SPDU is not used by TP. Its use by a U-ASE in profiles 11 and 12 is not specified by this ISP; however, its use by a U-ASE in profiles 21,22,31 and 32 is prohibited

A.6.36 ACTIVITY END ACK (AEA) SPDU

This SPDU is not used by TP. Its use by a U-ASE in profiles 11 and 12 is not specified by this ISP; however, its use by a U-ASE in profiles 21,22,31 and 32 is prohibited

ANNEX B: Presentation PROTOCOL PDUs (Normative)

B.1. PRESENTATION SERVICE PARAMETERS

This subclause details TP's requirements on the presentation protocol. The reader should consult the Upper Layer agreements for a detailed discussion of these services. This ISP only specifies PDU parameters necessary for this ISP.

B.1.2. CONNECTION INITIATOR or RESPONDER CAPABILITIES

Table 1 - CONNECTION INITIATOR OR RESPONDER CAPABILITIES

ITEM#	ISO/IEC 8823-2		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Initiator	O		C101		
2	Responder	O		M		

101. If capable of initiating an association then M, else I.

B.1.3. PROTOCOL MECHANISMS

Table 2 -PROTOCOL MECHANISMS

ITEM#	ISO/IEC 8823-2		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	X.410 (1984)	O		NA		1
2	Normal	O		M		

NOTES

- Implementations that support X.410 mode shall respond to a CP PPDU proposing X.410-1984 mode with an S-U-ABRT; where the user data contains an AbortInformation data element (defined in X.410), which contains an AbortReason (type INTEGER) of value 4 (protocol error). Implementations that do not support X.410-1984 mode shall respond with either a Presentation-Provider abort or a Presentation-Provider Reject.

B.1.4. FUNCTIONAL UNITS

Table 3 - FUNCTIONAL UNITS

ITEM#	ISO/IEC 8823-2		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Kernel	M		M		
2	Presentation Context Management	O		*		
3	Presentation Context Restoration	C		*		

B.1.5. PRESENTATION PDU USAGE BY PROFILE

Table 4 KERNEL PDU USAGE BY PROFILE

ITEM #	PROTOCOL DATA UNITS	ISO/IEC 8823-2	PROFILES						NOTES
			11	21	31	12	22	32	
1	CONNECT PRESENTATION (CP)	C/C	C101 /M	C101 /M	C101 /M	C101 /M	C101 /M	C101 /M	
2	CONNECT PRESENTATION ACCEPT (CPA)	C/C	C102 /C101	C102 /C101	C102 /C101	C102 /C101	C102 /C101	C102 /C101	
3	CONNECT PRESENTATION REJECT (CPR)	C/C	M /C101	M /C101	M /C101	M /C101	M /C101	M /C101	
4	ABNORMAL RELEASE PROVIDER (ARP)	M	M	M	M	M	M	M	
5	ABNORMAL RELEASE USER (ARU)	M	M	M	M	M	M	M	
6	PRESENTATION DATA (TD)	M	M	M	M	M	M	M	

102. If capable of accepting an AARQ APDU then M, else NA.

B.1.6. PRESENTATION CONTEXT MANAGEMENT PDU USAGE BY PROFILE

Table 5 PRESENTATION CONTEXT MANAGEMENT PDU USAGE BY PROFILE

ITEM #	PROTOCOL DATA UNITS	ISO/IEC 8823-2	PROFILES						
			11	21	31	12	22	32	NOTES
1	ALTER CONTEXT (AC)	O/M	*	*	*	*	*	*	
2	ALTER CONTEXT ACKNOWLEDGE (ACA)	M	*	*	*	*	*	*	

B.1.7. OTHER PRESENTATION PDU USAGE BY PROFILE

Table 6 OTHER PRESENTATION PDU USAGE BY PROFILE

ITEM #	PROTOCOL DATA UNITS	ISO/IEC 8823-2	PROFILES						
			11	21	31	12	22	32	NOTES
1	PRESENTATION TYPED DATA (TTD)	M	*	M	M	*	M	M	
2	EXPEDITED DATA (TE)	O/M	*	*	*	*	*	*	
3	CAPABILITY DATA (TC)	O/M	*	NA	NA	*	NA	NA	
4	CAPABILITY DATA ACKNOWLEDGE (TCC)	O/M	*	NA	NA	*	NA	NA	
5	RESYNCHRONIZE (RS)	O/M	*	M	M	*	M	M	
6	RESYNCHRONIZE ACKNOWLEDGE (RSA)	O/M	*	M	M	*	M	M	

B.1.8. PRESENTATION CONTEXT RESTORATION FUNCTIONAL UNIT

No additional PPDUs.

B.2. SUPPORTED PARAMETERS

B.2.1. CONNECT PRESENTATION (CP) PPDU

Table 7 - CONNECT PRESENTATION (CP) PPDU

ITEM#	ISO/IEC 8823-2		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Calling Presentation Selector	O/M		M		
2	Called Presentation Selector	O/M		M		
3	Mode Selector	M		M	Normal	
4	Presentation Context Definition List	O/M		M		
5	Default Context Name	O/M		C103		
6	Protocol Version	O/M		M		
7	Presentation Requirements	O/M		*		1
8	User Session Requirements	O/M		C104		1
9	User Data	O/M		M		

103. If the Expedited Data FU is supported then M, else I.

104. If the Context Management FU is supported then M, else I.

NOTES

- TP does not use this parameter, however a U-ASE is not prohibited from using it, subject to the restrictions imposed by TP on the use of Session Functional Units.

B.2.2. CONNECT PRESENTATION ACCEPT (CPA) PPDU

Table 8 - CONNECT PRESENTATION ACCEPT (CPA) PPDU

ITEM#	ISO/IEC 8823-2		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Responding Presentation Selector	O/M		M		
2	Mode Selector	M		M	Normal	
3	Presentation Context Definition Result List	O/M		M		
4	Protocol Version	O/M		M		
5	Presentation Requirements	O/M		*		1
6	User Session Requirements	O/M		C104		1
7	User Data	O/M		M		

NOTES

- TP does not use this parameter, however a U-ASE is not prohibited from using it, subject to restrictions imposed by TP on the use of Session Functional Units.

B.2.3. CONNECT PRESENTATION REJECT (CPR) PPDU

Table 9 - CONNECT PRESENTATION REJECT (CPR) PPDU

ISO/IEC 8823-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Responding Presentation Selector	O/M		M		
2	Presentation Context Definition Result List	O/M		M		
3	Protocol Version	O/M		M		
4	Default Context Result	O/M		C105		
5	Provider Reason	O/M		M		1
6	User Data	O/M		M		

105. If capable of proposing Default Context then M, else I.

NOTES

1. For enhanced interoperability it is recommended that appropriate provider reason values be sent with all CPR PPDUs.

B.2.4. ABNORMAL RELEASE USER (ARU) PPDU

Table 10 - ABNORMAL RELEASE USER (ARU) PPDU

ISO/IEC 8823-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Presentation Context Identifier List	O/M		M		
2	User Data	O/M		M		

B.2.5. ABNORMAL RELEASE PROVIDER (ARP) PPDU

Table 11 - ABNORMAL RELEASE PROVIDER (ARP) PPDU

ISO/IEC 8823-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Abort Reason	O/M		M		1
2	Event Identifier	O/M		M		2

NOTES

1. For enhanced interoperability it is recommended that appropriate provider reason values be sent with all ARP PPDUs.

2. For enhanced interoperability it is recommended that appropriate event identifier values be sent with all ARP PPDUs.

B.2.6. ALTER CONTEXT (AC) PPDU

This PPDU is not used by TP. Its use by a U-ASE is not specified by this ISP.

B.2.7. ALTER CONTEXT ACKNOWLEDGE (ACA) PPDU

This PPDU is not used by TP. Its use by a U-ASE is not specified by this ISP.

B.2.8. PRESENTATION DATA (TD) PPDU

Table 12 - PRESENTATION DATA (TD) PPDU

ISO/IEC 8823-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	User-data	O/M		M		

B.2.9. PRESENTATION TYPED DATA (TTD) PPDU

Table 13 - PRESENTATION TYPED DATA (TTD) PPDU

This PPDU is not applicable to profiles 11 and 12.

BASE STANDARD ISO 8823			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	User-data	O/M		M		

B.2.10. EXPEDITED DATA (TE) PPDU

This PPDU is not used by TP. Its use by a U-ASE is not specified by this ISP.

B.2.11. CAPABILITY DATA (TC) PPDU

This PPDU is not used by TP. Its use by a U-ASE is not specified by this ISP. It can be used by Profiles 11 and 12 However its use by a U-ASE in profiles 21,22,31 and 32 is prohibited.

B.2.12. CAPABILITY DATA ACKNOWLEDGE (TCC) PPDU

This PPDU is not used by TP. Its use by a U-ASE is not specified by this ISP. It can be used by Profiles 11 and 12 However its use by a U-ASE in profiles 21,22,31 and 32 is prohibited.

B.2.13. RESYNCHRONIZE (RS) PPDU

Table 14- RESYNCHRONIZE (RS) PPDU

This PPDU is not applicable to profiles 11 and 12.

BASE STANDARD ISO 8823			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Presentation Context Identifier List	C/C		C104		
2	User-data	O/M		M		

B.2.14. RESYNCHRONIZE ACKNOWLEDGE (RSA) PPDU

Table 15 - RESYNCHRONIZE ACKNOWLEDGE (RSA) PPDU

This PPDU is not applicable to profiles 11 and 12.

BASE STANDARD ISO 8823			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTE
1	Presentation Context Identifier List	O/M		C104		
2	User-data	O/M		M		

B.2.15. SESSION SERVICE PRIMITIVES NOT CARRYING PRESENTATION PCI

Table 16 SESSION SERVICE PRIMITIVES NOT CARRYING PRESENTATION PCI

ITEM #	PRIMITIVES	ISO/IEC 8823-2	PROFILES						NOTES
			11	21	31	12	22	32	
1	S-REL req/ind	C	O/M	O/M	O/M	O/M	O/M	O/M	
2	S-REL rsp/cnf	C	*(M) /C106	*(M) /C106	*(M) /C106	*(M) /C106	*(M) /C106	*(M) /C106	
3	S-PT req/ind	C	*	M	M	*	M	M	
4	S-SYNm req/ind	C	*	M	M	*	M	M	
5	S-SYNm rsp/cnf	C	*	M	M	*	M	M	
6	S-SYNM req/ind	C	*	*	*	*	*	*	
7	S-SYNM rsp/cnf	O/M	*	*	*	*	*	*	
8	S-UER req/ind	C	NA	NA	NA	NA	NA	NA	
9	S-ACTS req/ind	C	*	NA	NA	*	NA	NA	
10	S-ACTR req/ind	C	*	NA	NA	*	NA	NA	
11	S-ACTE req/ind	C	*	NA	NA	*	NA	NA	
12	S-ACTE rsp/cnf	C	*	NA	NA	*	NA	NA	

106. If capable of initiating an S-REL req M then else I.

B.3. SUPPORT OF SYNTAXES

B.3.1. TRANSFER SYNTAXES SUPPORTED

Table 17 - TRANSFER SYNTAXES SUPPORTED

ITEM#	TYPE	DETAIL	SUPPORT	
			BASE	P
1	Object Identifier	joint-iso-ccitt asn1(1) basic-encoding(1)	M	M

B.3.2. ABSTRACT SYNTAXES SUPPORTED

Table 18 - ABSTRACT SYNTAXES

ITEM#	TYPE	DETAIL	PROFILE ID	SUPPORT		NOTES
				BASE	P	
1	Object Identifier	joint-iso-ccitt association-control(2) abstract-syntax(1) apdus(0) version1(1)		O	M	
2	Object Identifier	joint-iso-ccitt ccr(7) abstract-syntax(1) apdus(0) version2(2)	11,12	O	I	1
			21,22,31,32	O	M	
3	Object Identifier	joint-iso-ccitt tp(10) abstract-syntax(1) apdus(0) version1(1)		O	M	

NOTES

1. This ISP specifies that a referencing specification shall not use CCR when operating with profile 11 or profile 12 (in particular, refer to Parts 5 and 6 clause 7). However, when the abstract syntaxes are negotiated at the Presentation level, it is not possible to identify whether a protocol error shall be detected or not (this can be detected at the OSI TP level).

ANNEX C: ACSE PROTOCOL PDUs (Normative)

This subclause details TP's use of ACSE services and parameters. The reader should consult the upper layer agreements for a detailed discussion of these services. This ISP only specifies PDU parameters necessary for this ISP.

C.1. SUPPORTED FUNCTIONS

Table 1 - SUPPORTED FUNCTIONS

ISO/IEC 8650-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Normal Mode	O		M		
2	X.410 - 1984 mode	O		NA		1
3	Rules for Extensibility	M		M		
4	Supports Operation of Session Vers. 2	O		M		

NOTES

- Implementations that support X.410 mode shall respond to a CP PPDU proposing X.410-1984 mode with an S-U-ABRT; where the user data contains an AbortInformation data element (defined in X.410), which contains an AbortReason (type INTEGER) of value 4 (protocol error). Implementations that do not support X.410-1984 mode shall respond with either a Presentation-Provider abort or a Presentation-Provider Reject.

C.2. INITIATOR/RESPONDER CAPABILITIES

Table 2 -INITIATOR/RESPONDER CAPABILITIES

ISO/IEC 8650-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Association Initiator	O	11,12	O		
			21,22,31,32	M		
2	Association Responder	O	11,12	M		1
			21,22,31,32	M		

NOTES

- An implementation shall be capable of rejecting an AARQ APDU, acceptance of an AARQ APDU is optional.

C.3. FUNCTIONAL UNITS**Table 3 -FUNCTIONAL UNITS**

ITEM#	ISO/IEC 8650-2		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Kernel	M		M		
2	Authentication	O		*		

C.4. ACSE PDU USAGE BY PROFILE**Table 4 ACSE PDU USAGE BY PROFILE**

ITEM #	Protocol Data Units	ISO/IEC 8650-2	Profiles						
			11	21	31	12	22	32	Notes
1	A-ASSOCIATE-REQUEST (AARQ)	C/C	C101/M	M	M	C101/M	M	M	1
2	A-ASSOCIATE-RESPONSE (AARE)	C/C	M/C101	M	M	M/C101	M	M	1
3	A-RELEASE-REQUEST (RLRQ)	O/M	O/M	O/M	O/M	O/M	O/M	O/M	
4	A-RELEASE-RESPONSE (RLRE)	M/C	M/C102	M/C102	M/C102	M/C102	M/C102	M/C102	
5	A-ABORT (ABRT)	C/C	M	M	M	M	M	M	

101. If capable of initiating an Association then M, else I.

102. If capable of initiating A-RELEASE then M, else I.

NOTES

1. All implementations, including initiator only ones, shall have the capability to receive an AARQ APDU and rejecting it with an AARE APDU.

C.5. A-ASSOCIATE-REQUEST (AARQ)

Table 5 - A-ASSOCIATE-REQUEST (AARQ)

ITEM#	ISO/IEC 8650-2		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Protocol Version	C/M		M		
2	Application Context Name	M		M		
3	Calling AP Title	O/M	11,12 21,31,22,32	O/M M	See Table 10 See Table 10	1 1
4	Calling AE Qualifier	O/M	11,12 21,31,22,32	O/M M	See Table 10See Table 10	1 1
5	Calling AP Invocation Identifier	O/M	11,12 21,31,22,32	O/M O/M		1 1, 2
6	Calling AE Invocation Identifier	O/M	11,12 21,31,22,32	O/M O/M		1 1,2
7	Called AP Title	O/M		O/M	See Table 10	
8	Called AE Qualifier	O/M		O/M	See Table 10	
9	Called AP Invocation Identifier	O/M	11,12 21,31,22,32	O/M O/M		1,3 1,3
10	Called AE Invocation Identifier	O/M	11,12 21,31,22,32	O/MO/M		1,3 1,3
11	Implementation Information	C/M		I		
12	Requester ACSE Requirements	C/M		*		
13	Mechanism Name	C/M		*		
14	Calling Authentication Value	C/M		*		
15	User Information	O/M		M		

NOTES

- For implementations using association pools, these parameters are recommended in order to re-use associations.
- If this parameter is received, then it is recommended to be logged and used for the reestablishment of the association during transaction recovery.
- If this parameter is sent, then it is recommended to be logged and used for the reestablishment of the association during transaction recovery.

C.6. A-ASSOCIATE-RESPONSE (AARE)**Table 6 - A-ASSOCIATE-RESPONSE (AARE)**

ISO/IEC 8650-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Protocol Version	C/M		M		
2	Application Context Name	M		M		
3	Responding AP Title	O/M	11,12	O/M	See Table 10	1
			21,31,22,32	M	See Table 10	1
4	Responding AE Qualifier	O/M	11,12	O/M	See Table 10	1
			21,31,22,32	M	See Table 10	1
5	Responding AP Invocation Identifier	O/M	11,12	O/M		
			21,31,22,32	O/M		2
6	Responding AE Invocation Identifier	O/M	11,12	O/M		
			21,31,22,32	O/M		2
7	Result	M		M		
8	Result Source - Diagnostic	M		M	1 - 10	
		C		*	11 - 14	
9	Implementation Information	O/M		I		
10	Requester ACSE Requirements	C/M		*		
11	Mechanism Name	C/M		*		
12	Calling Authentication Value	C/M		*		
13	User Information	O/M		M		

NOTES

1. This parameter shall be present on an AARE APDU if the called parameter was present in the AARQ APDU and the responding parameter is different from the called parameter.
2. If this parameter is received, then it is recommended to be logged and used for re-establishment of the association during transaction recovery.

C.7 A-RELEASE-REQUEST (RLRQ)**Table 7 - A-RELEASE-REQUEST (RLRQ)**

ISO/IEC 8650-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Reason	O/M		I		
2	User Information	O/M		I		

B.2.8. PRESENTATION DATA (TD) PPDU

Table 12 - PRESENTATION DATA (TD) PPDU

	ISO/IEC 8823-2		PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	User-data	O/M		M		

B.2.9. PRESENTATION TYPED DATA (TTD) PPDU

Table 13 - PRESENTATION TYPED DATA (TTD) PPDU

This PPDU is not applicable to profiles 11 and 12.

	BASE STANDARD ISO 8823		PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	User-data	O/M		M		

B.2.10. EXPEDITED DATA (TE) PPDU

This PPDU is not used by TP. Its use by a U-ASE is not specified by this ISP.

B.2.11. CAPABILITY DATA (TC) PPDU

This PPDU is not used by TP. Its use by a U-ASE is not specified by this ISP. It can be used by Profiles 11 and 12 However its use by a U-ASE in profiles 21,22,31 and 32 is prohibited.

B.2.12. CAPABILITY DATA ACKNOWLEDGE (TCC) PPDU

This PPDU is not used by TP. Its use by a U-ASE is not specified by this ISP. It can be used by Profiles 11 and 12 However its use by a U-ASE in profiles 21,22,31 and 32 is prohibited.

B.2.13. RESYNCHRONIZE (RS) PPDU

Table 14- RESYNCHRONIZE (RS) PPDU

This PPDU is not applicable to profiles 11 and 12.

	BASE STANDARD ISO 8823		PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Presentation Context Identifier List	C/C		C104		
2	User-data	O/M		M		

B.2.14. RESYNCHRONIZE ACKNOWLEDGE (RSA) PPDU

Table 15 - RESYNCHRONIZE ACKNOWLEDGE (RSA) PPDU

This PPDU is not applicable to profiles 11 and 12.

	BASE STANDARD ISO 8823		PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTE
1	Presentation Context Identifier List	O/M		C104		
2	User-data	O/M		M		

B.2.15. SESSION SERVICE PRIMITIVES NOT CARRYING PRESENTATION PCI

Table 16 SESSION SERVICE PRIMITIVES NOT CARRYING PRESENTATION PCI

ITEM #	PRIMITIVES	ISO/IEC 8823-2	PROFILES						
			11	21	31	12	22	32	NOTES
1	S-REL req/Ind	C	O/M	O/M	O/M	O/M	O/M	O/M	
2	S-REL rsp/cnf	C	*M /C106	*M /C106	*M /C106	*M /C106	*M /C106	*M /C106	
3	S-PT req/Ind	C	*	M	M	*	M	M	
4	S-SYNm req/Ind	C	*	M	M	*	M	M	
5	S-SYNm rsp/cnf	C	*	M	M	*	M	M	
6	S-SYNM req/Ind	C	*	*	*	*	*	*	
7	S-SYNM rsp/cnf	O/M	*	*	*	*	*	*	
8	S-UER req/Ind	C	NA	NA	NA	NA	NA	NA	
9	S-ACTS req/Ind	C	*	NA	NA	*	NA	NA	
10	S-ACTR req/Ind	C	*	NA	NA	*	NA	NA	
11	S-ACTE req/Ind	C	*	NA	NA	*	NA	NA	
12	S-ACTE rsp/cnf	C	*	NA	NA	*	NA	NA	

106. If capable of initiating an S-REL req M then else I.

B.3. SUPPORT OF SYNTAX'S

B.3.1. TRANSFER SYNTAX'S SUPPORTED

Table 17 - TRANSFER SYNTAX'S SUPPORTED

				SUPPORT	
ITEM#	TYPE	DETAIL	BASE	P	
1	Object Identifier	joint-iso-ccitt asn1(1) basic-encoding(1)	M	M	

B.3.2. ABSTRACT SYNTAX'S SUPPORTED

Table 18 - ABSTRACT SYNTAX'S

				SUPPORT	
ITEM#	TYPE	DETAIL	PROFILE ID	BASE	P
1	Object Identifier	joint-iso-ccitt association-control(2) abstract-syntax(1) apdus(0) version1(1)		O	M
2	Object Identifier	joint-iso-ccitt ccr(7) abstract-syntax(1) apdus(0) version2(2)	11,12	O	NA
			21,22,31,32	O	M
3	Object Identifier	joint-iso-ccitt tp(10) abstract-syntax(1) apdus(0) version1(1)		O	M

ANNEX C: ACSE PROTOCOL PDUs (Normative)

This subclause details TP's use of ACSE services and parameters. The reader should consult the upper layer agreements for a detailed discussion of these services. This ISP only specifies PDU parameters necessary for this ISP.

C.1. SUPPORTED FUNCTIONS

Table 1 - SUPPORTED FUNCTIONS

ITEM#	ISO/IEC 8650-2		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Normal Mode	O		M		
2	X.410 - 1984 mode	O		NA		1
3	Rules for Extensibility	M		M		
4	Supports Operation of Session Vers. 2	O		M		

NOTES

1. The possibility of the TPPM generating an ACSE-user Abort in response to a proposed X.410-mode connection is not possible. Because no Presentation Contexts are proposed with the X.410-mode connection, it is not possible to build an ABRT APDU (at the very least the PCI for ACSE is missing). For implementations that support X.410-mode only, we propose responding to a CP PPDU proposing X.410-1984 mode with an S-U-ABRT setting the user data to AbortInformation data element (as defined in X.410), which contains the AbortReason (INTEGER) of value 4 (protocolError). For implementations that do not support X.410-1984 mode, it is sufficient to respond with either a Presentation-Provider Abort or a Presentation-Provider Refuse.

C.2. INITIATOR/RESPONDER CAPABILITIES

Table 2 -INITIATOR/RESPONDER CAPABILITIES

ITEM#	ISO/IEC 8650-2		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Association Initiator	O	11,12	O		
			21,22,31,32	M		
2	Association Responder	O	11,12	M		1
			21,22,31,32	M		

NOTES

1. An implementation shall be capable of rejecting an AARQ APDU, acceptance of an AARQ APDU is optional.

C.3. FUNCTIONAL UNITS

Table 3 -FUNCTIONAL UNITS

ITEM#	ISO/IEC 8650-2		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Kernel	M		M		
2	Authentication	O		*		

C.4. ACSE PDU USAGE BY PROFILE

Table 4 ACSE PDU USAGE BY PROFILE

ITEM #	Protocol Data Units	ISO/IEC 8650-2	Profiles						
			11	21	31	12	22	32	Notes
1	A-ASSOCIATE-REQUEST (AARQ)	C/C	C101/M	M	M	C101/M	M	M	1
2	A-ASSOCIATE-RESPONSE (AARE)	C/C	M/C101	M	M	M/C101	M	M	1
3	A-RELEASE-REQUEST (RLRQ)	O/M	O/M	O/M	O/M	O/M	O/M	O/M	
4	A-RELEASE-RESPONSE (RLRE)	M/C	M/C102	M/C102	M/C102	M/C102	M/C102	M/C102	
5	A-ABORT (ABRT)	C/C	M	M	M	M	M	M	

101. If capable of initiating an Association then M, else I.

102. If capable of initiating A-RELEASE then M, else I.

NOTES

1. All implementations, including initiator only ones, shall have the capability to receive an AARQ APDU and rejecting it with an AARE APDU.

C.5. A-ASSOCIATE-REQUEST (AARQ)

Table 5 - A-ASSOCIATE-REQUEST (AARQ)

ITEM#	ISO/IEC 8650-2		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Protocol Version	C/M		M		
2	Application Context Name	M		M		
3	Calling AP Title	O/M	11,12	O/M		1
			21,31,22,32	M		1
4	Calling AE Qualifier	O/M	11,12	O/M		1
			21,31,22,32	M		1
5	Calling AP Invocation Identifier	O/M	11,12	*		1
			21,31,22,32	O/M		1, 2
6	Calling AE Invocation Identifier	O/M	11,12	*		1
			21,31,22,32	O/M		1,2
7	Called AP Title	O/M		O/M		
8	Called AE Qualifier	O/M		O/M		
9	Called AP Invocation Identifier	O/M	11,12	*		1,2
			21,31,22,32	M		1,2
10	Called AE Invocation Identifier	O/M	11,12	*		1,2
			21,31,22,32	M		1,2
11	Implementation Information	C/M		I		
12	Requester ACSE Requirements	C/M		*		
13	Mechanism Name	C/M		*		
14	Calling Authentication Value	C/M		*		
15	User Information	O/M		M		

NOTES

- For implementations using association pools, these parameters are recommended in order to re-use associations.
- Responder must log calling Invocation identifiers for recovery if they are provided by the initiator. The capability to exchange called Invocation identifiers shall be implemented so that associations may re-establish the same AE-Invocation during recovery.

Temporary Note: The ACSE recovery issue has raised 2 questions: 1. Items 9 & 10 should they be marked M or O/M for the commitment profiles. 2. Should profiles 11 and 12 be marked the same as the commitment profiles. Also, Note 2 is an issue - the resolution of the ACSE recovery issue will resolve it.

C.6. A-ASSOCIATE-RESPONSE (AARE)

Table 6 - A-ASSOCIATE-RESPONSE (AARE)

ITEM#	ISO/IEC 8650-2		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Protocol Version	C/M		M		
2	Application Context Name	M		M		
3	Responding AP Title	O/M	11,12	O/M		1
			21,31,22,32	M		1
4	Responding AE Qualifier	O/M	11,12	O/M		1
			21,31,22,32	M		1
5	Responding AP Invocation Identifier	O/M		O/M		2
6	Responding AE Invocation Identifier	O/M		O/M		2
7	Result	M		M		
8	Result Source - Diagnostic	M		M	1 - 10	
		C		*	11 - 14	
9	Implementation Information	O/M		I		
10	Requester ACSE Requirements	C/M		*		
11	Mechanism Name	C/M		*		
12	Calling Authentication Value	C/M		*		
13	User Information	O/M		M		

NOTES

1. This parameter shall be present on an AARE APDU if the called parameter was present in the AARQ APDU and the responding parameter is different from the called parameter.
2. If this parameter is received, then it shall be logged and used for re-establishment of the association during recovery.

Temporary Note: The ACSE recovery issue has raised 2 questions: 1. Items 5 & 6 should they be marked M or O/M. 2. Should the commitment and non-commitment profiles be marked the same. Also, Note 2 is an issue - the resolution of the ACSE recovery issue will resolve it.

C.7 A-RELEASE-REQUEST (RLRQ)

Table 7 - A-RELEASE-REQUEST (RLRQ)

ISO/IEC 8650-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Reason	O/M		I		
2	User information	O/M		I		

C.8 A-RELEASE-RESPONSE (RLRE)

Table 8 - A-RELEASE-RESPONSE (RLRE)

ISO/IEC 8650-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Reason	O/M		I		
2	User information	O/M		I		

C.9 A-ABORT (ABRT)

Table 9 - A-ABORT (ABRT)

ISO/IEC 8650-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Abort Source	M		M		
2	Abort Diagnostic	C		*		
3	User Information	O/M		M		

C.10. AE TITLE NAME FORMS

Table 10 - AE TITLE NAME FORMS

ITEM#	ISO/IEC 8650-2		PROFILE			
	SYNTAX FORM	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Form 1 (Directory Name)	O/M		O/M		
2	Form 2 (Object ID)	O/M		M		

C.11. AUTHENTICATION VALUE FORM

Table 11 - AUTHENTICATION VALUE FORM

ITEM#	ISO/IEC 8650-2		PROFILE			
	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Graphic String	C/C		*		
2	Bit String	C/C		*		
3	External	C/C		*		
4	Any Defined By	C/C		*		

C.8. A-RELEASE-RESPONSE (RLRE)

Table 8 - A-RELEASE-RESPONSE (RLRE)

ISO/IEC 8650-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Reason	O/M		I		
2	User Information	O/M		I		

C.9. A-ABORT (ABRT)

Table 9 - A-ABORT (ABRT)

ISO/IEC 8650-2			PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Abort Source	M		M		
2	Abort Diagnostic	C		*		
3	User Information	O/M		M		

C.10. AE TITLE NAME FORMS

Table 10 - AE TITLE NAME FORMS

	ISO/IEC 8650-2		PROFILE			
ITEM#	SYNTAX FORM	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Form 1 (Directory Name)	O/M		O/M	1 .. 1024 octets	1
2	Form 2 (Object ID)	O/M		M	1 .. 64 octets	1

NOTES

1. The limits specified apply to the AE-Title which is the combination of the AP-Title and AE-Qualifier. They are specified in line with the limits given in Part 3 on the Atomic-Action Identifier and the Branch Identifier.

C.11. AUTHENTICATION VALUE FORM

Table 11 - AUTHENTICATION VALUE FORM

	ISO/IEC 8650-2		PROFILE			
ITEM#	PARAMETER	STATUS	PROFILE ID	STATUS	T/L/V ALLOWED	NOTES
1	Graphic String	C/C		*		
2	Bit String	C/C		*		
3	External	C/C		*		
4	Any Defined By	C/C		*		

TITLE: WORKING DOCUMENT FOR

Information Technology - Open Systems Interconnection - International Standardized Profile 12061-5:
OSI TP

Part 5: Application Supported Transaction - Polarized Control (ATP11)

SOURCE: Joint AOW / EWOS / OIW on Transaction Processing

DATE: September 25, 1992

STATUS: This document has been produced during the second AOW/EWOS/OIW joint meeting on Transaction Processing (Brussels - June 23-26, 1992). Its content is considered by the three experts groups as harmonized, and all issues have been resolved. The OIW, formally, considers this document to be harmonized with all issues resolved and will submit it to ISO/IEC JTC1/SGFS when the document is approved by the other workshop plenaries. The final document is expected to be submitted to ISO/IEC JTC1/SGFS by November 1992.

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5. USE OF FUNCTIONAL UNITS
6. SCENARIO
7. USAGE OF UNDERLYING STANDARDS
8. DETAILED DESCRIPTION

Introduction

The aim of Open Systems Interconnection is to allow, with a minimum of technical agreement outside the interconnection standards, the interconnection of computer systems

- a. from different manufacturers,
- b. under different management,
- c. of different levels of complexity,
- d. of different technologies.

Transaction Processing is concerned with identifiable information which can be related as transactions, which may involve two or more Open Systems. In the framework of Open Systems Interconnection (OSI) a transaction is defined as "a set of related operations characterized by four properties: atomicity, consistency, isolation and durability."

The definition highlights that a distributed transaction is more than a simple exchange of messages, but that the exchanges form a protected indivisible set.

This multi-part document contains the complete specification of the six profiles identified in M-IT-02 and TR 10000.

Part 1 contains the taxonomy for the OSI TP profiles.

Part 2 contains the specification of the support of OSI TP APDUs for each of the profiles specified in Parts 5 to 10.

Part 3 contains the specification of the support of the CCR APDUs for each of the profiles specified in Part 5 to 10.

Part 4 contains the specification of the support of ACSE, Presentation and Session APDUs for each of the profiles specified in Part 5 to 10.

Parts 5 to 10 specify the six profiles which are defined, based on the OSI TP standard. These six parts make reference to Parts 2 to 4.

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**Information Technology - Open Systems Interconnection - International
Standardized Profiles 12061-5: OSI Distributed Transaction Processing.**

**Part 5: APPLICATION SUPPORTED TRANSACTIONS - POLARIZED CONTROL
(ATP11)**

1. SCOPE

This Part of this ISP defines the OSI TP profile used for Application Supported Transaction while the application is using the Polarized Control paradigm for communications.

2. NORMATIVE REFERENCES

The references listed in Part 1 of this ISP apply to this Part.

3. DEFINITIONS AND ABBREVIATIONS

The definitions and abbreviations listed in Part 1 of this ISP apply to this Part.

4. OVERVIEW

Profile ATP11 is applicable to end systems concerned with operating in the Open Systems Interconnection (OSI) environment. This profile specifies a combination of OSI standards, which collectively provide support for Application Supported Distributed Transactions, where the applications take responsibility for ensuring that transaction semantics are maintained, and for restoring consistency after any failure. The dialogue between the applications is subject to strict turn control. The handshake facility is available.

5. USE OF FUNCTIONAL UNITS

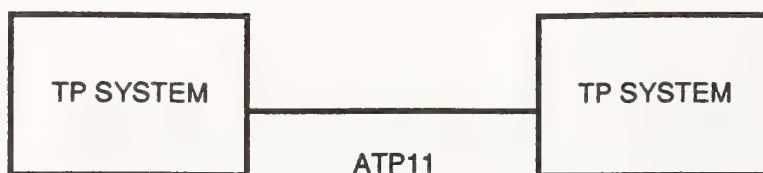
An implementation of this profile supports the OSI TP functional units identified in the table hereafter:

DIALOGUE	mandatory
POLARIZED CONTROL	mandatory
HANDSHAKE	mandatory

It conforms to the Application Transactions conformance class defined in ISO 10026-3.

6. SCENARIO

The applicability of the ATP11 profile is illustrated by the figure hereafter:



7. USAGE OF UNDERLYING STANDARDS

This profile specifies the required functions from the supporting protocol stacks shown below. The use of ISO/IEC 9804/9805 (CCR) by a referencing specification is forbidden and is a protocol error.

Application Layer	ISO 10026-3:1992 (OSI TP) ISO 8650 ¹ (ACSE)
Presentation Layer	ISO 8825:1990 (BER ASN.1) ISO 8823:1988(Presentation)
Session Layer	ISO 8327 ³

8. DETAILED DESCRIPTION

The support of the OSI TP, ACSE, Presentation and Session PDUs for ATP11 is as described in Parts 1,2 and 4 of this standard.

9. CONFORMANCE

Conformance requirements specified in ISO/IEC ISP 12061-1, ISO/IEC ISP 12061-2, ISO/IEC ISP 12061-4 apply to this part.

For each implementation claiming conformance to this part of ISO/IEC 12061, the following PICS Proformas shall be completed and made available :

- ISO/IEC 10026-4 (OSI TP)
- ISO/IEC 8650-2 (ACSE)
- ISO/IEC 8823-2 (Presentation)
- ISO/IEC 8327-2 (Session)

³To be published



TITLE: WORKING DOCUMENT FOR

Information Technology - Open Systems Interconnection - International Standardized Profile 12061-6:
OSI TP

Part 6: Application Supported Transactions- Shared Control (ATP12)

SOURCE: Joint AOW / EWOS / OIW on Transaction Processing

DATE: September 25, 1992

STATUS: This document has been produced during the second AOW/EWOS/OIW joint meeting on Transaction Processing (Brussels - June 23-26, 1992). Its content is considered by the three experts groups as harmonized, and all issues have been resolved. The OIW, formally, considers this document to be harmonized with all issues resolved and will submit it to ISO/IEC JTC1/SGFS when the document is approved by the other workshop plenaries. The final document is expected to be submitted to ISO/IEC JTC1/SGFS by November 1992.

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7. USAGE OF UNDERLYING STANDARDS
8. DETAILED DESCRIPTION

INTRODUCTION

The aim of Open Systems Interconnection is to allow, with a minimum of technical agreement outside the interconnection standards, the interconnection of computer systems

- a. from different manufacturers,
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- c. of different levels of complexity,
- d. of different technologies.

Transaction Processing is concerned with identifiable information which can be related as transactions, which may involve two or more Open Systems. In the framework of Open Systems Interconnection (OSI) a transaction is defined as "a set of related operations characterized by four properties: atomicity, consistency, isolation and durability."

The definition highlights that a distributed transaction is more than a simple exchange of messages, but that the exchanges form a protected indivisible set.

This multi-part document contains the complete specification of the six profiles identified in M-IT-02 and TR 10000.

Part 1 contains the taxonomy for the OSI TP profiles.

Part 2 contains the specification of the support of OSI TP APDUs for each of the profiles specified in Parts 5 to 10.

Part 3 contains the specification of the support of the CCR APDUs for each of the profiles specified in Part 5 to 10.

Part 4 contains the specification of the support of ACSE, Presentation and Session APDUs for each of the profiles specified in Part 5 to 10.

Parts 5 to 10 specify the six profiles which are defined, based on the OSI TP standard. These six parts make reference to Parts 2 to 4.

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**Information Technology - Open Systems Interconnection - International
Standardized Profiles 12061-6: OSI Distributed Transaction Processing.**

**Part 6: APPLICATION SUPPORTED TRANSACTIONS - SHARED CONTROL
(ATP12)**

1. SCOPE

This Part of this ISP defines the OSI TP profile used for Application Supported Transaction while the application is using the Shared Control paradigm for communications.

2. NORMATIVE REFERENCES

The references listed in Part 1 of this ISP apply to this Part.

3. DEFINITIONS AND ABBREVIATIONS

The definitions and abbreviations listed in Part 1 of this ISP apply to this Part.

4. OVERVIEW

Profile ATP12 is applicable to end systems concerned with operating in the Open Systems Interconnection (OSI) environment. This profile specifies a combination of OSI standards, which collectively provide support for Application Supported Distributed Transactions, where the applications take responsibility for ensuring that transaction semantics are maintained, and for restoring consistency after any failure. The dialogue between the applications is not subject to turn control. The support of the handshake facility is optional.

5. USE OF FUNCTIONAL UNITS

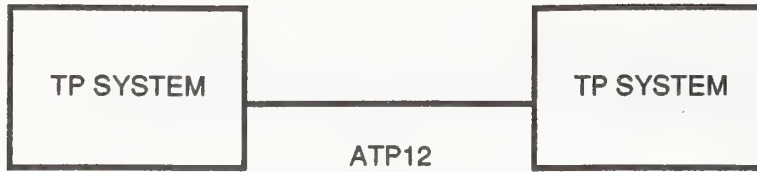
An implementation of this profile supports the OSI TP functional units as shown hereafter:

DIALOGUE	mandatory
SHARED CONTROL	mandatory
HANDSHAKE	optional

It conforms to the Application Transactions conformance class defined in ISO 10026-3.

6. SCENARIO

The applicability of the ATP12 profile is illustrated by the figure hereafter:



7. USAGE OF UNDERLYING STANDARDS

This profile specifies the required functions from the supporting protocol stacks shown below. The use of ISO/IEC 9804/9805 (CCR) by a referencing specification is forbidden and is a protocol error.

Application Layer	ISO 10026-3:1992 (OSI TP) ISO 8650 ¹ (ACSE)
Presentation Layer	ISO 8825:1990 (BER ASN.1) ISO 8823:1988(Presentation)
Session Layer	ISO 8327 ⁴

8. DETAILED DESCRIPTION

The support of the OSI TP, ACSE, Presentation and Session PDUs for ATP12 is as described in Parts 1,2 and 4 of this standard.

9. CONFORMANCE

Conformance requirements specified in ISO/IEC ISP 12061-1, ISO/IEC ISP 12061-2, ISO/IEC ISP 12061-4 apply to this part.

For each implementation claiming conformance to this part of ISO/IEC 12061, the following PICS Proformas shall be completed and made available :

- ISO/IEC 10026-4 (OSI TP)
- ISO/IEC 8650-2 (ACSE)
- ISO/IEC 8823-2 (Presentation)
- ISO/IEC 8327-2 (Session)

⁴To be published

TITLE: WORKING DOCUMENT FOR

Information Technology - Open Systems Interconnection - International Standardized Profile 12061-7:
OSI TP

Part 7: Provider Supported Unchained Transactions - Polarized Control (ATP21)

SOURCE: Joint AOW / EWOS / OIW on Transaction Processing

DATE: September 25, 1992

STATUS: This document has been produced during the second AOW/EWOS/OIW joint meeting on Transaction Processing (Brussels - June 23-26, 1992). Its content is considered by the three experts groups as harmonized, and all issues have been resolved. The OIW, formally, considers this document to be harmonized with all issues resolved and will submit it to ISO/IEC JTC1/SGFS when the document is approved by the other workshop plenaries. The final document is expected to be submitted to ISO/IEC JTC1/SGFS by November 1992.

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INTRODUCTION

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This multi-part document contains the complete specification of the six profiles identified in M-IT-02 and TR 10000.

Part 1 contains the taxonomy for the OSI TP profiles.

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Part 3 contains the specification of the support of the CCR APDUs for each of the profiles specified in Part 5 to 10.

Part 4 contains the specification of the support of ACSE, Presentation and Session APDUs for each of the profiles specified in Part 5 to 10.

Parts 5 to 10 specify the six profiles which are defined, based on the OSI TP standard. These six parts make reference to Parts 2 to 4.

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Information Technology - Open Systems Interconnection - International
Standardized Profiles 12061-7: OSI Distributed TRANSACTION PROCESSING.

Part 7: PROVIDER SUPPORTED UNCHAINED TRANSACTIONS - POLARIZED
CONTROL (ATP21)

1. SCOPE

This Part of this ISP defines the OSI TP profile used for unchained sequences of Provider Supported Transaction branches while the application is using the Polarized Control paradigm for communications.

2. NORMATIVE REFERENCES

The references listed in Part 1 of this ISP apply to this Part.

3. DEFINITIONS AND ABBREVIATIONS

The definitions and abbreviations listed in Part 1 of this ISP apply to this Part.

4. OVERVIEW

Profile ATP21 is applicable to end systems concerned with operating in the Open Systems Interconnection (OSI) environment. This profile specifies a combination of OSI standards, which collectively provide support for Provider Supported Distributed Transactions, where the provider of the OSI TP service takes responsibility for ensuring transaction ACID properties and for restoring consistency after any failure. Two applications operate on a dialogue in an Unchained sequence of Provider Supported Transaction Branches. The dialogue between the applications is subject to strict turn control. The handshake facility is available.

5. USE OF FUNCTIONAL UNITS

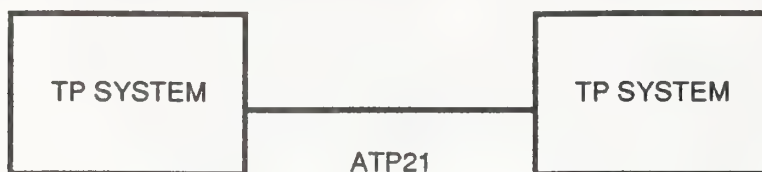
An implementation of this profile supports the OSI TP functional units as shown hereafter:

DIALOGUE	mandatory
POLARIZED CONTROL	mandatory
HANDSHAKE	mandatory
COMMIT	mandatory
UNCHAINED TRANSACTIONS	mandatory
RECOVERY	mandatory

It conforms to the Unchained Provider Supported Transaction Branches conformance class defined in ISO 10026-3.

6. SCENARIO

The applicability of the ATP21 profile is illustrated by the figure hereafter:



7. USAGE OF UNDERLYING STANDARDS

This profile specifies the required functions from the supporting protocol stacks shown below.

Application Layer	ISO 10026-3:1992 (OSI TP) ISO 8650 ¹ (ACSE) ISO 9805:1990 (CCR) ISO 9805 AM2
Presentation Layer	ISO 8825:1990 (BER ASN.1) ISO 8823:1988 (Presentation) ISO 8823 AM5
Session Layer	ISO 8327 ⁵ ISO 8327 AM3

8. DETAILED DESCRIPTION

The support of the OSI TP, CCR, ACSE, Presentation and Session PDUs for ATP21 is as described in Parts 1 - 4 of this standard.

9. CONFORMANCE

Conformance requirements specified in ISO/IEC ISP 12061-1, ISO/IEC ISP 12061-2, ISO/IEC ISP 12061-3, ISO/IEC ISP 12061-4 apply to this part.

For each implementation claiming conformance to this part of ISO/IEC 12061, the following PICS Proformas shall be completed and made available :

- ISO/IEC 10026-4 (OSI TP)
- ISO/IEC 9805-2 (CCR)
- ISO/IEC 8650-2 (ACSE)
- ISO/IEC 8823-2 (Presentation)
- ISO/IEC 8327-2 (Session)

⁵To be published

TITLE: WORKING DOCUMENT FOR

Information Technology - Open Systems Interconnection - International Standardized Profile 12061-8:
OSI TP

Part 8: Provider Supported Unchained Transactions - Shared Control (ATP22)

SOURCE: Joint AOW / EWOS / OIW on Transaction Processing

DATE: September 25, 1992

STATUS: This document has been produced during the second AOW/EWOS/OIW joint meeting on Transaction Processing (Brussels - June 23-26, 1992). Its content is considered by the three experts groups as harmonized, and all issues have been resolved. The OIW, formally, considers this document to be harmonized with all issues resolved and will submit it to ISO/IEC JTC1/SGFS when the document is approved by the other workshop plenaries. The final document is expected to be submitted to ISO/IEC JTC1/SGFS by November 1992.

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INTRODUCTION

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Transaction Processing is concerned with identifiable information which can be related as transactions, which may involve two or more Open Systems. In the framework of Open Systems Interconnection (OSI) a transaction is defined as "a set of related operations characterized by four properties: atomicity, consistency, isolation and durability."

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Part 3 contains the specification of the support of the CCR APDUs for each of the profiles specified in Part 5 to 10.

Part 4 contains the specification of the support of ACSE, Presentation and Session APDUs for each of the profiles specified in Part 5 to 10.

Parts 5 to 10 specify the six profiles which are defined, based on the OSI TP standard. These six parts make reference to Parts 2 to 4.

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**Information Technology - Open Systems Interconnection - International
Standardized Profiles 12061-8: OSI Distributed Transaction Processing.**

**Part 8: PROVIDER SUPPORTED UNCHAINED TRANSACTIONS - SHARED
CONTROL (ATP22)**

1. SCOPE

This Part of this ISP defines the OSI TP profile used for Unchained sequences of Provider Supported Transaction branches while the application is using the Shared Control paradigm for communications.

2. NORMATIVE REFERENCES

The references listed in Part 1 of this ISP apply to this Part.

3. DEFINITIONS AND ABBREVIATIONS

The definitions and abbreviations listed in Part 1 of this ISP apply to this Part.

4. OVERVIEW

Profile ATP22 is applicable to end systems concerned with operating in the Open Systems Interconnection (OSI) environment. This profile specifies a combination of OSI standards, which collectively provide support for Provider Supported Distributed Transactions, where the provider of the OSI TP service takes responsibility for ensuring transaction ACID properties and for restoring consistency after any failure. Two applications operate on a dialogue in an Unchained sequence of Provider Supported Transaction Branches. The dialogue between the applications is not subject to turn control. The support of the handshake facility is optional.

5. USE OF FUNCTIONAL UNITS

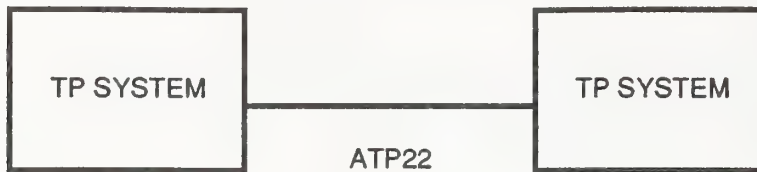
An implementation of this profile supports the OSI TP functional units as shown hereafter:

DIALOGUE	mandatory
SHARED CONTROL	mandatory
HANDSHAKE	optional
COMMIT	mandatory
UNCHAINED TRANSACTION	mandatory
RECOVERY	mandatory

It conforms to the Unchained Provider Supported Transactions Branches conformance class defined in ISO 10026-3.

6. SCENARIO

The applicability of the ATP22 profile is illustrated by the figure hereafter:



7. USAGE OF UNDERLYING STANDARDS

This profile specifies the required functions from the supporting protocol stacks shown below.

Application Layer	ISO 10026-3:1992 (OSI TP) ISO 8650 ¹ (ACSE) ISO 9805:1990(CCR) ISO 9805 AM2
Presentation Layer	ISO 8825:1990 (BER ASN.1) ISO 8823:1988(Presentation) ISO 8823 AM5
Session Layer	ISO 8327 ⁶ ISO 8327 AM3

8. DETAILED DESCRIPTION

The support of the OSI TP, CCR, ACSE, Presentation and Session PDUs for ATP22 is as described in Parts 1 - 4 of this standard.

9. CONFORMANCE

Conformance requirements specified in ISO/IEC ISP 12061-1, ISO/IEC ISP 12061-2, ISO/IEC ISO/IEC ISP 12061-3, ISP 12061-4 apply to this part.

For each implementation claiming conformance to this part of ISO/IEC 12061, the following PICS Proformas shall be completed and made available :

- ISO/IEC 10026-4 (OSI TP)
- ISO/IEC 9805-2 (CCR)
- ISO/IEC 8650-2 (ACSE)
- ISO/IEC 8823-2 (Presentation)
- ISO/IEC 8327-2 (Session)

⁶To be published

TITLE: WORKING DOCUMENT FOR

Information Technology - Open Systems Interconnection - International Standardized Profile 12061-9:
OSI TP

Part 9: Provider Supported Chained Transactions - Polarized Control (ATP31)

SOURCE: Joint AOW / EWOS / OIW on Transaction Processing

DATE: September 25, 1992

STATUS: This document has been produced during the second AOW/EWOS/OIW joint meeting on Transaction Processing (Brussels - June 23-26, 1992). Its content is considered by the three experts groups as harmonized, and all issues have been resolved. The OIW, formally, considers this document to be harmonized with all issues resolved and will submit it to ISO/IEC JTC1/SGFS when the document is approved by the other workshop plenaries. The final document is expected to be submitted to ISO/IEC JTC1/SGFS by November 1992.

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INTRODUCTION

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Transaction Processing is concerned with identifiable information which can be related as transactions, which may involve two or more Open Systems. In the framework of Open Systems Interconnection (OSI) a transaction is defined as "a set of related operations characterized by four properties: atomicity, consistency, isolation and durability."

The definition highlights that a distributed transaction is more than a simple exchange of messages, but that the exchanges form a protected indivisible set.

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Part 3 contains the specification of the support of the CCR APDUs for each of the profiles specified in Part 5 to 10.

Part 4 contains the specification of the support of ACSE, Presentation and Session APDUs for each of the profiles specified in Part 5 to 10.

Parts 5 to 10 specify the six profiles which are defined, based on the OSI TP standard. These six parts make reference to Parts 2 to 4.

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Information Technology - Open Systems Interconnection - International Standardized Profiles 12061-9: OSI Distributed Transaction Processing.

Part 9: PROVIDER SUPPORTED CHAINED TRANSACTIONS - POLARIZED CONTROL (ATP31)

1. SCOPE

This Part of this ISP defines the OSI TP profile used for chained sequences of Provider Supported Transaction branches while the application is using the Polarized Control paradigm for communications.

2. NORMATIVE REFERENCES

The references listed in Part 1 of this ISP apply to this Part.

3. DEFINITIONS AND ABBREVIATIONS

The definitions listed in Part 1 of this ISP apply to this Part.

4. OVERVIEW

Profile ATP31 is applicable to end systems concerned with operating in the Open Systems Interconnection (OSI) environment. This profile specifies a combination of OSI standards, which collectively provide support for Provider Supported Distributed Transactions, where the provider of the OSI TP service takes responsibility for ensuring transaction ACID properties and for restoring consistency after any failure. Two applications operate on a dialogue in an Chained Sequence of Provider Supported Transaction Branches. The dialogue between the applications is subject to strict turn control. The handshake facility is available.

5. USE OF FUNCTIONAL UNITS

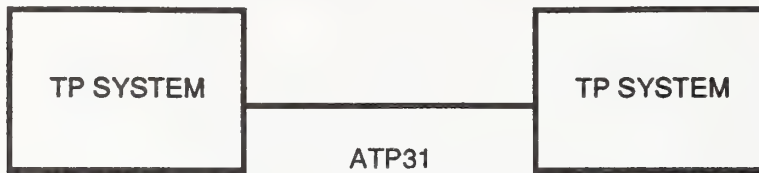
An implementation of this profile supports the OSI TP functional units as shown hereafter:

DIALOGUE	mandatory
POLARIZED CONTROL	mandatory
HANDSHAKE	mandatory
COMMIT	mandatory
CHAINED TRANSACTION	mandatory
RECOVERY	mandatory

It conforms to the Chained Provider Supported Transaction Branches conformance class defined in ISO 10026-3.

6. SCENARIO

The applicability of the ATP31 profile is illustrated by the figure hereafter:



7. USAGE OF UNDERLYING STANDARDS

This profile specifies the required functions from the supporting protocol stacks shown below.

Application Layer	ISO 10026-3:1992 (OSI TP) ISO 8650 ¹ (ACSE) ISO 9805:1990(CCR) ISO 9805 AM2
Presentation Layer	ISO 8825:1990 (BER ASN.1) ISO 8823:1988(Presentation) ISO 8823 AM5
Session Layer	ISO 8327 ⁷ ISO 8327 AM3

8. DETAILED DESCRIPTION

The support of the OSI TP, CCR, ACSE, Presentation and Session PDUs for ATP31 is as described in Parts 1 -4 of this standard.

9. CONFORMANCE

Conformance requirements specified in ISO/IEC ISP 12061-1, ISO/IEC ISP 12061-2, ISO/IEC ISO/IEC ISP 12061-3, ISP 12061-4 apply to this part.

For each implementation claiming conformance to this part of ISO/IEC 12061, the following PICS Proformas shall be completed and made available :

- ISO/IEC 10026-4 (OSI TP)
- ISO/IEC 9805-2 (CCR)
- ISO/IEC 8650-2 (ACSE)
- ISO/IEC 8823-2 (Presentation)
- ISO/IEC 8327-2 (Session)

⁷To be published

TITLE: WORKING DOCUMENT FOR

Information Technology - Open Systems Interconnection - International Standardized Profile 12061-10:
OSI TP

Part 10: Provider Supported Chained Transactions - Shared Control (ATP32)

DATE: September 25, 1992

STATUS: This document has been produced during the second AOW/EWOS/OIW joint meeting on Transaction Processing (Brussels - June 23-26, 1992). Its content is considered by the three experts groups as harmonized, and all issues have been resolved. The OIW, formally, considers this document to be harmonized with all issues resolved and will submit it to ISO/IEC JTC1/SGFS when the document is approved by the other workshop plenaries. The final document is expected to be submitted to ISO/IEC JTC1/SGFS by November 1992.

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1. SCOPE
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INTRODUCTION

The aim of Open Systems Interconnection is to allow, with a minimum of technical agreement outside the interconnection standards, the interconnection of computer systems

- a. from different manufacturers,
- b. under different management,
- c. of different levels of complexity,
- d. of different technologies.

Transaction Processing is concerned with identifiable information which can be related as transactions, which may involve two or more Open Systems. In the framework of Open Systems Interconnection (OSI) a transaction is defined as "a set of related operations characterized by four properties: atomicity, consistency, isolation and durability."

The definition highlights that a distributed transaction is more than a simple exchange of messages, but that the exchanges form a protected indivisible set.

This multi-part document contains the complete specification of the six profiles identified in M-IT-02 and TR 10000.

Part 1 contains the taxonomy for the OSI TP profiles.

Part 2 contains the specification of the support of OSI TP APDUs for each of the profiles specified in Parts 5 to 10.

Part 3 contains the specification of the support of the CCR APDUs for each of the profiles specified in Part 5 to 10.

Part 4 contains the specification of the support of ACSE, Presentation and Session APDUs for each of the profiles specified in Part 5 to 10.

Parts 5 to 10 specify the six profiles which are defined, based on the OSI TP standard. These six parts make reference to Parts 2 to 4.

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**Information Technology - Open Systems Interconnection - International
Standardized Profiles 12061-10: OSI Distributed Transaction Processing.**

**Part 10: PROVIDER SUPPORTED CHAINED TRANSACTIONS - SHARED
CONTROL (ATP32)**

1. SCOPE

This Part of this ISP defines the OSI TP profile used for chained sequences of Provider Supported Transaction branches while the application is using the Shared Control paradigm for communications.

2. NORMATIVE REFERENCES

The references listed in Part 1 of this ISP apply to this Part.

3. DEFINITIONS AND ABBREVIATIONS

The definitions and abbreviations listed in Part 1 of this ISP apply to this Part.

4. OVERVIEW

Profile ATP32 is applicable to end systems concerned with operating in the Open Systems Interconnection (OSI) environment. This profile specifies a combination of OSI standards, which collectively provide support for Provider Supported Distributed Transactions, where the provider of the OSI TP service takes responsibility for ensuring transaction ACID properties and for restoring consistency after any failure. Two applications operate on a dialogue in an Chained sequence of Provider Supported Transaction Branches. The dialogue between the applications is not subject to turn control. The support of the handshake facility is optional.

5. USE OF FUNCTIONAL UNITS

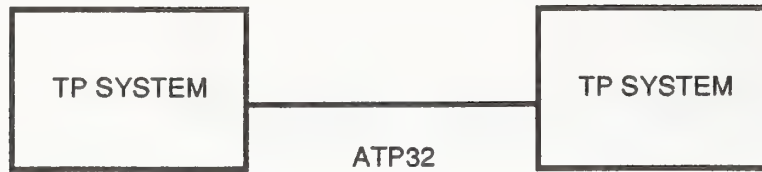
An implementation of this profile supports the OSI TP functional units as shown hereafter:

DIALOGUE	mandatory
SHARED CONTROL	mandatory
HANDSHAKE	optional
COMMIT	mandatory
CHAINED TRANSACTION	mandatory
RECOVERY	mandatory

It conforms to the Chained Provider Supported Transaction Branches conformance class defined in ISO 10026-3.

6. SCENARIO

The applicability of the ATP32 profile is illustrated by the figure hereafter:



7. USAGE OF UNDERLYING STANDARDS

This profile specifies the required functions from the supporting protocol stacks shown below.

Application Layer	ISO 10026-3:1992 (OSI TP) ISO 8650 ¹ (ACSE) ISO 9805:1990(CCR) ISO 9805 AM2
Presentation Layer	ISO 8825:1990 (BER ASN.1) ISO 8823:1988(Presentation) ISO 8823 AM5
Session Layer	ISO 8327 ⁸ ISO 8327 AM3

8. DETAILED DESCRIPTION

The support of the OSI TP, CCR, ACSE, Presentation and Session PDUs for ATP32 is as described in Parts 1 - 4 of this standard.

9. CONFORMANCE

Conformance requirements specified in ISO/IEC ISP 12061-1, ISO/IEC ISP 12061-2, ISO/IEC ISO/IEC ISP 12061-3, ISP 12061-4 apply to this part.

For each implementation claiming conformance to this part of ISO/IEC 12061, the following PICS Proformas shall be completed and made available :

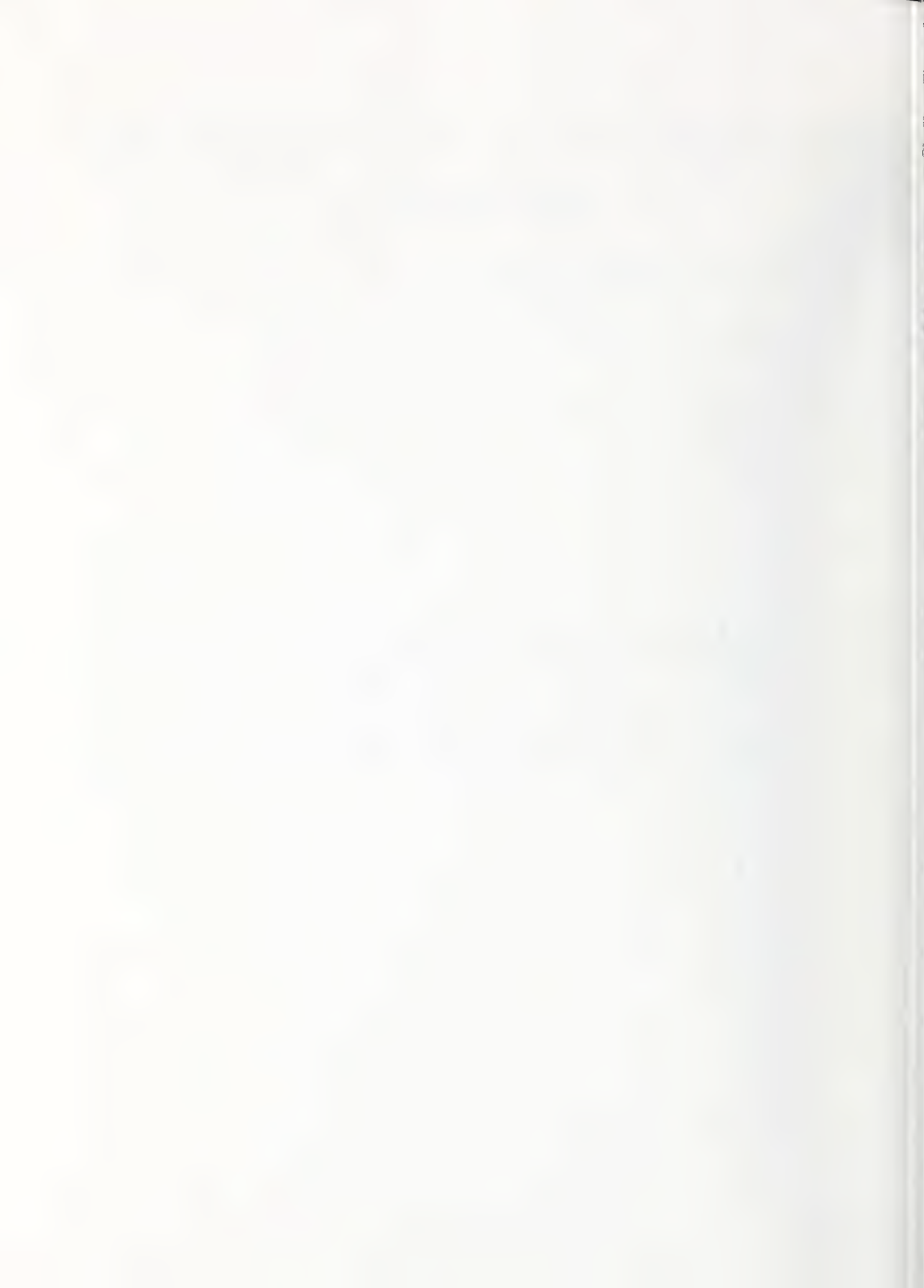
- ISO/IEC 10026-4 (OSI TP)
- ISO/IEC 9805-2 (CCR)
- ISO/IEC 8650-2 (ACSE)
- ISO/IEC 8823-2 (Presentation)
- ISO/IEC 8327-2 (Session)

⁸To be published

Stable Implementation Agreements for Open Systems Interconnection Protocols: Part 16 - Office Document Architecture Level 3 DAP

Output from the September 1992 Open Systems
Environment Implementors' Workshop (OIW)

SIG Chair: **Jim Wing, IBM**
SIG Editor: **Jim Wing, IBM**



Part 16 - Office Document Architecture Level 3 DAP

NOTE - It is the intent of the Open Systems Interconnection Implementors' Workshop (OIW) to move into this part the Office Document Architecture (ODA) Document Application Profile (DAP) known as FOD36, when it is approved as an International Standardized Profile (ISP). The ISP has received the number of affirmative ballots required under the rules of the ISO/IEC Joint Technical Committee 1, Special Group on Functional Standards (SGFS), and is undergoing revision and final editing preparatory to publication. Refer to Part 16 of the Working Agreements of this Workshop for the current version of this text.

This replaces previous contents of this part.

Stable Implementation Agreements for Open Systems Interconnection Protocols: Part 17 - Office Document Architecture Level 2 DAP

Output from the September 1992 Open Systems
Environment Implementors' Workshop (OIW)

SIG Chair: **Jim Wing, IBM**
SIG Editor: **Jim Wing, IBM**

Foreword

This part of the Stable Implementation Agreements was prepared by the Office Document Architecture Special Interest Group (ODASIG) of the Open Systems Environment Implementors' Workshop (OIW).

Text in this part has been approved by the Plenary of the above-mentioned Workshop. No significant technical change has occurred in this part since it was previously presented.

Future changes and additions to this version of these Implementor Agreements will be published as change pages. Deleted and replaced text will be shown as struckout. New and replacement text will be shown as shaded.

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Part 17 - Office Document Architecture Level 2 DAP **1**

Part 17 - Office Document Architecture Level 2 DAP

NOTE - It is the intent of the Open Systems Interconnection Implementors' Workshop (OIW) to move into this part the Office Document Architecture (ODA) document application profile (DAP) known as FOD26 when it is approved as an International Standardized Profile (ISP). The text for the ISP has received the number of affirmative ballots required by the rules of the ISO/IEC Joint Technical Committee 1, Special Group on Functional Standards (SGFS), and is undergoing revision and final editing preparatory to publication. Refer to Part 17 of the Working Agreements of this Workshop for the current version of this text.

This replaces previous contents of this part.

Stable Implementation Agreements for Open Systems Interconnection Protocols: Part 18 - Network Management

Output from the September 1992 Open Systems
Environment Implementors' Workshop (OIW)

SIG Chair
SIG Editor

Paul Brusil, The Mitre Corporation
Robert Aronoff, NIST

Foreword

This part of the Stable Implementation Agreements was prepared by the Network Management Special Interest Group (NMSG) of the Open Systems Environment Implementors' Workshop (OIW). See Procedures Manual for Workshop charter.

Text in this part has been approved by the Plenary of the above-mentioned Workshop. This part replaces the previously existing chapter on this subject.

To highlight textual changes since the last Workshop output, additions to the text in this part are marked with shading; deleted text is left in but marked with strikeouts.

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18 Network Management

0 Introduction

Within the community of OSI researchers, users, and vendors, there is a recognized need to address the problems of initiating, terminating, monitoring, and controlling communication activities and assisting in their harmonious operation, as well as handling abnormal conditions. The activities that address these problems are collectively called network management.

Network management can be viewed as the set of operational and administrative mechanisms necessary to:

- a. bring up, enroll, and/or alter network resources;
- b. keep network resources operational;
- c. fine tune these resources and/or plan for their expansion;
- d. manage the accounting of their usage;
- e. manage their protection from unauthorized use/tampering.

As such, network management is typically concerned with management activities in at least the following five functional areas: configuration management, fault management, performance management, accounting management, and security management. In order to accomplish these management activities, information must be exchanged among open systems.

In Part 18, there are Implementation Agreements (IA's) for providing interoperable OSI management information communication services among OSI systems. Also contained here are agreements on management information. These agreements pertain to the exchange of management information and management commands between open systems operating in a multivendor environment. For example, one goal is to ensure that a management system built by one vendor can manage objects built by another vendor.

1 Scope

The purpose of this Part (Part 18), is to provide implementation agreements that will enable independent vendors to supply customers with a diverse set of networking products that can be managed as part of an integrated environment. Where possible, these agreements are based upon OSI Systems Management standards.

1.1 Phased Approach

Because of the broad scope of the subject, and given that OSI Systems Management standards are still evolving, it is reasonable to assume that a comprehensive set of network management implementation agreements will take a number of years to develop. To arrive at an initial set of implementation agreements in a timely fashion, a phased approach has been adopted.

This phased work approach will result in a series of implementation agreements based on the expanding scope of the OSI Systems Management standards. It is the intention of the NMSIG to define the content of each phase as a compatible superset of the previous Phases to ensure that Phase N products can interact with products based on the implementation agreements of earlier phases.

1.1.1 Alignment With Evolving Standards

In some cases, these phased implementation agreements may be based on DIS standards. As the relevant standards progress from DIS to IS, the agreements will be aligned in future phases.

When a defect is found in any of the management related standards, the reported defect may be technically resolved by the appropriate international technical committee with likely approval by the voting members pending for several months. Since relevant defects can't be ignored in an implementation, these agreements will note defect resolutions which have the tentative approval of the appropriate standards committee. These interim resolutions will be recorded in clause 4.

Once a defect resolution has been completed by the appropriate standards body, the agreed upon resolution will be incorporated into the next phase of these implementors agreements. If appropriate, a previous phase that relied on an interim resolution will be examined to determine whether errata should be issued to bring the original phase into line with the final resolution.

1.1.2 Definition of Phase 1

As a first step in this phased approach, the NMSIG has targeted an initial set of agreements that provide limited interoperable management in a heterogeneous vendor environment. They are the beginning of a comprehensive set of implementation agreements based on the emerging OSI Systems Management standards. Furthermore, these initial agreements allow the community to gain experience with OSI management standards as they emerge.

The focus of the Phase 1 agreements is to enable a managing process provided by one vendor to interoperate with an agent process provided by a different vendor to perform limited management on a set of managed objects.

The scope of Phase 1 implementation agreements is the following:

Management Functions:

Object Management Function [OMF],
State Management Function [STMF],
Attributes For Representing Relationships [ARR],
Alarm Reporting Function [ARF],
Event Report Management Function [ERMF].

Management Information:

Information Model, Naming, Guidelines and Templates for Defining Managed Objects

Management Communication:

CMIS/P, Association Policies, and Upper Layer Services Required

Management Objects:

Support Objects required for the above.

Editor's Note: [The relation of the MIL definitions in Annex A of the Working Document to Phase 1 IA's needs to be clarified.]

Conformance Criteria:

Conformance Criteria for the above functionality.

To accomplish these goals in a timely fashion, the following simplifying constraints have been reflected in the Phase 1 agreements:

1. No agreements are provided regarding management domains;
2. These agreements require only the following application service elements: the Association Control Service Element (ACSE), the Common Management Information Service Element (CMISE), Remote Operations Service Element (ROSE), and the System Management Application Service Element (SMASE);
3. These agreements do not require implementation of services defined by the Directory standards;

4. No agreements regarding the security of management are provided.

1.1.3 Future Phases

It is the intention of the NMSIG to freeze the content of Phase 1 when these agreements are progressed to Stable status. Alignment changes required as the standards progress from DIS to IS will be made in future phases.

As standards defining new functionality are progressed, the NMSIG will define future phases incorporating the new functionality as a compatible superset of previous phases.

2 Normative References

The following documents are referenced in the statements of the agreements relating to OSI systems management.

Editor's Note: [Items marked with an asterisk, "*", are ones which, while not cited in the text of this part of the IAs, are included here, nevertheless, to indicate where useful background information can be found.]

- | | |
|-----------|---|
| [ACSEP] | ISO 8650, Information Processing Systems - Open Systems Interconnection - Protocol Specification for the Association Control Service Element (Revised Final Text of DIS 8650), ISO/IEC JTC1/SC21 N2327, 21 April 1988. |
| [ACSES]* | ISO 8649, Information Processing Systems - Open Systems Interconnection - Service Definition for the Association Control Service Element (Revised Final Text of DIS 8649), ISO/IEC JTC1/SC21 N2326, 21 April 1988. |
| [ADDRMVP] | ISO/IEC 9596/DAD 2, Common Management Information Protocol Specification: Addendum 2 (Add/Remove Protocol), ISO/IEC JTC1/SC21, 1 February 1990. |
| [ADDRMVS] | ISO/IEC 9595/DAD 2, Common Management Information Service Definition: Addendum 2 (Add/Remove Service), ISO/IEC JTC1/SC21, 1 February 1990. |
| [ALS]* | ISO/IEC DIS 9545, Information Processing Systems - Open Systems Interconnection - Application Layer Structure, 15 March 1989. |
| [AOM1PT1] | ISO/IEC ISP 11183-1, Information Technology - International Standardized Profiles AOM1n OSI Management - Management Communications - Part 1: Specification of ACSE, Presentation and Session Protocols for the use by ROSE and CMISE, May 1992. |
| [AOM1PT3] | ISO/IEC ISP 11183-3, Information Technology - International Standardized Profiles AOM1n OSI Management - Management Communications - Part 3: CMISE/ROSE for AOM11 - Basic Management Communications, May 1992. |

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- [AOM1PT2] ISO/IEC ISP 11183-2, Information Technology - International Standardized Profiles AOM1n OSI Management - Management Communications - Part 2: CMISE/ROSE for AOM12 - Enhanced Management Communications, May 1992.
- [AOM211] pDISP 12060-1, Information Technology - International Standardized Profiles - AOM2n OSI Management - Management Functions - Part 1: AOM211 - General Management Capabilities, July 1992.
- [AOM212] pDISP 12060-2, Information Technology - International Standardized Profiles - AOM2n OSI Management - Management Functions - Part 2: AOM212 - Alarm Reporting and State Management Capabilities, July 1992.
- [AOM213] pDISP 12060-3, Information Technology - International Standardized Profiles - AOM2n OSI Management - Management Functions - Part 3: AOM213 - Alarm Reporting Capabilities, July 1992.
- [AOM221] pDISP 12060-4, Information Technology - International Standardized Profiles - AOM2nn OSI Management - Management Functions - Part 4: AOM221 - General Event Report Management, July 1992.
- [AOM231] pDISP 12060-5, Information Technology - International Standardized Profiles - AOM2n OSI Management - Management Functions - Part 5: AOM231 - General Log Control Profile, July 1992.
- [ARF] ISO/IEC IS 10164-4, Information Technology - Open Systems Interconnection - Systems Management - Part 4: Alarm Reporting Function, ISO/IEC JTC1/SC21 N6359, August 19, 1991.
- [ARR] ISO/IEC IS 10164-3, Information Technology - Open Systems Interconnection - Systems Management - Part 3: Attributes for Representing Relationships, ISO/IEC JTC1/SC21 N5186, September 1991.
- [ASN1]* ISO/IEC 8824, Information Technology - Open System Interconnection - Specification of Abstract Syntax Notation One (ASN.1), ISO/IEC JTC1/SC21 N4720, 30 April 1990.
- [BER] ISO/IEC 8825, Information Technology - Open Systems Interconnection - Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1), ISO/IEC JTC1/SC21 N4721, 30 April 1990.
- [CANGETP] ISO/IEC 9596/DAD 1, Common Management Information Protocol Specification: Addendum 1 (CancelGet Protocol), ISO/IEC JTC1/SC21, 1 February 1990.
- [CANGETS] ISO/IEC 9595/DAD 1, Common Management Information Service Definition: Addendum 1 (CancelGet Service), ISO/IEC JTC1/SC21, 1 February 1990.

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- [CMIP] ISO/IEC 9596-1, Information Technology - Open Systems Interconnection - Common Management Information Protocol Specification - Part 1: Specification, 24 November 1990.
- [CMIS] ISO/IEC 9595, Information Technology - Open Systems Interconnection - Common Management Information Service Definition, Common Management Information Service, 24 November 1990.
- [DIR]* ISO 9594 - Information Processing Systems - Open Systems Interconnection - The Directory, 1988.
- [DMI] ISO/IEC IS 10165-2, Information Technology - Open Systems Interconnection - Structure of Management Information - Part 2: Definition of Management Information, ISO/IEC JTC1/SC21 N6363, August 1991.
- [ENSCON]* Forum 025, The "Ensemble" Concepts and Format, Issue 1.0, Network Management Forum, July 1992.
- [ERMF] ISO/IEC IS 10164-5, Information Technology - Open Systems Interconnection - Systems Management - Part 5: Event Report Management Function, ISO/IEC JTC1/SC21 N6360, August 1991.
- [FRMWK]* ISO 7498-4, Information Processing Systems - Open Systems Interconnection - Basic Reference Model - Part 4: Management Framework, 1989.
- [GDMO] ISO/IEC IS 10165-4, Information Technology - Open Systems Interconnection - Structure of Management Information - Part 4: Guidelines for the Definition of Managed Objects, ISO/IEC JTC1/SC21 N6309, July 30, 1991.
- [ISPARR3] pDISP 12059-3, Information Technology - International Standardized Profiles - OSI Management - Common Information for Management Functions - Part 3: Attributes for Representing Relationships, July 1992.
- [ISPAR4] pDISP 12059-4, Information Technology - International Standardized Profiles - OSI Management - Common Information for Management Functions - Part 4: Alarm Reporting, July 1992.
- [ISPCOM0] pDISP 12059-0, Information Technology - International Standardized Profiles - OSI Management - Common Information for Management Functions - Part 0: Common Definitions for Management Function Profiles, July 1992.
- [ISPERM5] pDISP 12059-5, Information Technology - International Standardized Profiles - OSI Management - Common Information for Management Functions - Part 5: Event Report Management, July 1992.

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- [ISPFM] ISO/IEC TR 10000-1, Information Technology - Framework and Taxonomy of International Standardized Profiles - Part 1: Framework, ISO/IEC JTC1/SGFS N184, 9 February 1990.
- [ISPLC6] pDISP 12059-6, Information Technology - International Standardized Profiles - OSI Management - Common Information for Management Functions - Part 6: Log Control, July 1992.
- [ISPOM1] pDISP 12059-1, Information Technology - International Standardized Profiles - OSI Management - Common Information for Management Functions - Part 1: Object Management, July 1992.
- [ISPSRVC] ISO/IEC TR 8509, Information Processing Systems - Open Systems Interconnection - Service Conventions, TC97/SC16/1646.
- [ISPSTM2] pDISP 12059-2, Information Technology - International Standardized Profiles - OSI Management - Common Information for Management Functions - Part 2: State Management, July 1992.
- [LCF] ISO/IEC IS 10164-6, Information Technology - Open Systems Interconnection - Systems Management - Part 6: Log Control Function, ISO/IEC JTC1/SC21 N6361, June 1991.
- [MGNM]* CCITT Recommendation M.gnm, Draft Recommendation (M.gnm) Generic Network Information Model, CCITT SGIV, December 3, 1991.
- [MIM] ISO/IEC IS 10165-1, Information Technology - Open Systems Interconnection - Management Information Services - Structure of Management Information - Part 1: Management Information Model, ISO/IEC JTC1/SC21 N6351, June 1991.
- [NMSIG1] OIW Endorsement/Comment on System Management Function Taxonomy (Including Proposed Function Taxonomy), NMSIG-91/164, September 1991.
- [OMF] ISO/IEC IS 10164-1, Information Technology - Open Systems Interconnection - Systems Management - Part 1: Object Management Function, ISO/IEC JTC1/SC21 N5184, September 1991.
- [OP1LIB]* Forum 006, Forum Library - Volume 4: OMNIPoint 1 Definitions, Issue 1.0, Network Management Forum, August 1992.
- [PPS]* ISO/IEC DIS 8823, Information Processing Systems - Open Systems Interconnection - Connection Oriented Presentation Protocol Specification, ISO/IEC JTC1/SC21 N2336, 5 April 1988.
- [PSD]* ISO/IEC Final Text of DIS 8822, Information Processing Systems - Open Systems Interconnection - Connection Oriented Presentation Service Definition, ISO/IEC JTC1/SC21 N2335, 5 April 1988.

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- [ROSEP]*** **ISO/IEC 9072-2 - Information Processing Systems - Text Communications - Remote Operations Part 2: Protocol Specification, 19 September 1989.**
- [ROSES]*** **ISO/IEC 9072-1, Information Processing Systems - Text Communications - Remote Operations Part 1: Model, Notation and Service Definition, 19 September 1989.**
- [SARF]** **ISO/IEC IS 10164-7, Information Technology - Open Systems Interconnection - Systems Management - Part 7: Security Alarm Reporting Function, July 1991.**
- [SATF]** **ISO/IEC DIS 10164-8, Information Technology - Open Systems Interconnection - Systems Management - Part 8: Security Audit Trail Function, ISO/IEC JTC1/SC21 N7039, June 1992.**
- [SMO]** **ISO/IEC IS 10040, Information Technology - Open Systems Interconnection - Systems Management Overview, ISO/IEC JTC1/SC21 N6353, August 1991.**
- [STMF]** **ISO/IEC IS 10164-2, Information Technology - Open Systems Interconnection - Systems Management - Part 2: State Management Function, ISO/IEC JTC1/SC21 N5185, September 1991.**

4 Errata

Editor's Note: ["Defect Report" material (including applicability) may be included here.]

The following table indicates the clause, type, and reference document of technical errata to this part.

Erratum No.	Type & Date Entered	Referenced Document	Clause	Comment
1	Technical 6/91	NMSIG-91/08	6.4.5	This clause, previously clause 6.2.6, was modified and moved to clause 6.4.5 to clarify that it is intended as a support agreement for CMIP rather than a usage agreement for CMIS.
2	Alignment 9/91	NMSIG-91/110 NMSIG-91/113	5	This clause has been updated to reflect alignment changes to the relevant base standards which have just progressed to IS as of August, 1991.
3	Technical 9/91	NMSIG-91/161	6.2.2.2	Move text from clause 5.1.2.1 to more appropriate clause 6.2.2.2 and clarify required support for minimal filter complexity to align with the DISP 11183.
4	Technical 9/91	NMSIG-91/161	6.2.3	Remove unnecessary restrictions on sending CMIP time parameters.
5	Alignment 9/91	NMSIG-91/114	6.1.1	Change reference to required application context support to align with IS version of [SMO].
6	Technical 9/91	NMSIG-91/161	6.3.3.1	Remove clause requiring mandatory attribute list in successful set response because considered redundant information.
7	Alignment 9/91	NMSIG-91/120	7	Update clause to reflect alignment changes to the relevant base standards which have progressed to IS as of August, 1991.

Erratum No.	Type & Date Entered	Referenced Document	Clause	Comment
8	Editorial 9/91	NMSIG-91/161	6.3.6.1	Move clause 6.3.6.1 to more appropriate location at clause 7.1.5.
9	Alignment 3/92	NMSIG-92/066	6.1.3	Update reference because number of clause in other part of OIW Stable Agreements changed.

3 Status

As of September 1991, the Stable management communications agreements in clause 6 of part 18 and clause 13.7 of part 5 became technically equivalent to DISP 11183. The DISP, however, is a more rigorous statement of specifications. Therefore, it has been the stated intent of the NMSIG to directly reference the ISP 11183, Parts 1 through 3, and all the agreements therein, when the DISP reaches ISP status. Since the DISP has now progressed to ISP 11183 with no technical changes, the NMSIG Stable management communications agreements in clause 6 of part 18 have now been changed to point directly to ISP 11183-1 through -3 [AOM1PT1, AOM1PT2, and AOM1PT2].

(Refer to the Working Implementation Agreements Document for additional status information.)

4 Errata

Editor's Note: ["Defect Report" material (including applicability) may be included here.]

The following table indicates the clause, type, and reference document of technical errata to this part.

Erratum No.	Type & Date Entered	Referenced Document	Clause	Comment
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2	Alignment 9/91	NMSIG-91/110 NMSIG-91/113	5	This clause has been updated to reflect alignment changes to the relevant base standards which have just progressed to IS as of August, 1991.
3	Technical 9/91	NMSIG-91/161	6.2.2.2	Move text from clause 5.1.2.1 to more appropriate clause 6.2.2.2 and clarify required support for minimal filter complexity to align with the DISP 11183.
4	Technical 9/91	NMSIG-91/161	6.2.3	Remove unnecessary restrictions on sending CMIP time parameters.
5	Alignment 9/91	NMSIG-91/114	6.1.1	Change reference to required application context support to align with IS version of [SMO].
6	Technical 9/91	NMSIG-91/161	6.3.3.1	Remove clause requiring mandatory attribute list in successful set response because considered redundant information.

Erratum No.	Type & Date Entered	Referenced Document	Clause	Comment
7	Alignment 9/91	NMSIG-91/120	7	Update clause to reflect alignment changes to the relevant base standards which have progressed to IS as of August, 1991.
8	Editorial 9/91	NMSIG-91/161	6.3.6.1	Move clause 6.3.6.1 to more appropriate location at clause 7.1.5.
9	Alignment 3/92	NMSIG-92/066	6.1.3	Update reference because number of clause in other part of OIW Stable Agreements changed.
10	Alignment 6/92	NMSIG-92/093	5.2 - 5.7	Update text to reference appropriate AOM2x pDISPs because have equivalent agreements, but are more rigorous.
11	Alignment 6/92	NMSIG - 92/200	6	Update text to reference ISP 11183 which is technically equivalent with IA text but is more rigorous.

5 Management Functions and Services

5.1 General Agreements

5.1.1 Conventions Used In SMF Agreements

Each System Management Function defines a set of services referred to in this document as "SMF services." Agreements pertinent to SMF services are provided in the following subclauses. Each subclause contains a series of tables, as follows.

For each SMF service, a normative table references text agreements which constrain the usage and/or value of the associated service parameters. Text agreements defined elsewhere in this document are referenced by clause number. The lack of a row or reference signifies no agreement beyond the base standard.

These tables include codes which specify parameter usage for request, indication, response, and confirmation service primitives. These codes, defined in subclause 1.8.3 of these agreements (Classification of Conformance), in ISO/IEC TR 10000-1 (Framework and Taxonomy of ISPs) [ISPFRM], and in ISO/IEC TR 8509 (Service Conventions) [ISPSRVC], are repeated here for reader convenience:

M	Mandatory
O	Optional
C(p)	If Condition p exists, then parameter is mandatory; otherwise, the parameter is not applicable.
X	Excluded
I	Out Of Scope
	In these agreements, this means that, for the corresponding element,
	* implementations may use it outside the scope of these agreements,
	* conformance tests shall not be provided for it,
	* implementations may conform to other agreements where it is required,
	* no requirements are placed on either transmitter or receiver to support it,
	* receiver actions are unspecified when present.
-	Not Applicable
(=)	The value of the parameter is identical to the corresponding parameter in the interaction described by the preceding related service primitive.
U	The use of the parameter is a service-user option.
P	The parameter is mapped directly onto the corresponding parameters of the CMIS service primitive; refer to subclause 6 for agreements regarding this pass-through parameter.

In addition, the convention "A > B" is used in normative tables to indicate both the usage specified by the base standard (A) and the additional constraint imposed by these agreements (B). This convention is intended to call attention to agreements which modify the usage of a service parameter.

Unless otherwise noted, conditional parameters (C) shall be present according to the conditions defined in [CMIS] and the referenced System Management Function base standard.

5.1.2 General Agreements Referenced By Many SMF Services

The following general agreements pertain to some or all of the System Management Function services defined throughout clause 5. Normative tables for each SMF service reference these general agreements where applicable. These agreements do not apply to SMF services and parameters which do not reference them.

5.1.2.1 Maximum Length of Notification Identifier

To limit implementation complexity, the maximum length of the Notification Identifier parameter shall be 32 bits.

5.1.2.2 Maximum Number of SET Items

To limit implementation complexity, the maximum number of SET items contained within specified SMF service parameters that recipients must be able to process shall be 64.

5.1.2.3 Maximum Length of Additional Text

To limit implementation complexity, the maximum length of the Additional Text parameter which recipients must be able to process shall be 256 octets.

5.1.2.4 Use of Additional Info

Editor's Note: [The Additional Information parameter, described in [ARF] clause 8.1.2.14, includes a "significance indicator." It requires that "[e]ven if the Additional Information parameter is not fully understood, an event report indication shall be issued to the user. Indication that the Additional Information parameter is not fully understood is a local matter."]

5.2 Object Management Function Agreements

5.2.1 General Agreements

These agreements require support for the SMF services defined by the object management standard [OMF].

These agreements also require conformance to the abstract syntaxes identified in clause 11 of the object management standard [OMF] and specified in [DMI], with the exception of event record subclasses. If support for the log control standard [LCF] as described in clause 5.7 is claimed, then all [OMF] event record subclasses shall also be required by these agreements. These agreements permit optional negotiation of the system management functional units specified in clause 10 of [OMF].

5.2.2 Specific Agreements

See [ISPOM1] for specification of agreements for the Object Management Function.

5.3 State Management Function Agreements

5.3.1 General Agreements

These agreements require support for the SMF services defined by the state management standard [STMF].

These agreements also require conformance to the abstract syntaxes identified in clause 11 of the state management standard [STMF] and specified in [DMI], with the exception of event record subclass. If support for the log control standard [LCF] as described in clause 5.7 is claimed, then all [STMF] event record subclasses shall also be required by these agreements. These agreements permit optional negotiation of the State Change Reporting functional unit specified in clause 10 of [STMF].

5.3.2 Specific Agreements

See [ISPSTM2] for specification of agreements for the State Management Function.

5.4 Attributes For Representing Relationships Agreements

5.4.1 General Agreements

These agreements require support for the SMF services defined by the Attributes For Representing Relationships standard [ARR].

These agreements also require conformance to the abstract syntaxes identified in clause 11 of the attributes for representing relationships standard [ARR] and specified in [DMI], with the exception of event record subclass. If support for the log control standard [LCF] as described in clause 5.7 is claimed, then all [ARR] event record subclasses shall also be required by these agreements. These agreements permit optional negotiation of the Relationship Change Reporting functional unit specified in clause 10 of [ARR].

5.4.2 Specific Agreements

See [ISPARR3] for specification of agreements for Attributes for Representing Relationships.

5.5 Alarm Reporting Function Agreements

5.5.1 General Agreements

These agreements require support for the SMF services defined by the alarm reporting standard [ARF].

These agreements also require conformance to the abstract syntaxes identified in clause 11 of the alarm reporting standard [ARF] and specified in [DMI], with the exception of event record subclass. If support for the log control standard [LCF] as described in clause 5.7 is claimed, then all [ARF] event record subclasses shall also be required by these agreements. These agreements permit optional negotiation of the Alarm Reporting functional unit specified in clause 10 of [ARF].

5.5.2 Specific Agreements

See [ISPAR4] for specification of agreements for the Alarm Reporting Function.

5.6 Event Report Management Function Agreements

5.6.1 General Agreements

These agreements require support for the SMF services defined by the event report management standard [ERMF].

These agreements also require conformance to the abstract syntaxes identified in clause 11 of the event report management standard [ERMF] and specified in [DMI]. These agreements permit optional negotiation of the Monitor Event Report Management and Event Report Management functional units specified in clause 10 of [ERMF].

5.6.2 Specific Agreements

See [ISPERM5] for specification of agreements for the Event Report Management Function.

5.7 Log Control Function Agreements

5.7.1 General Agreements

These agreements require the SMF services defined by the log control standard [LCF].

These agreements also require conformance to the abstract syntaxes identified in clause 11 of the log control standard [LCF] and specified in [DMI].

If any other function defined in clause 5 that supports notifications is supported, then any event record subclass defined by that function is required for the log control function.

These agreements permit optional negotiation for log control and monitor log control functional units specified in section 10 of [LCF].

5.7.2 Specific Agreements

See [ISPLC6] for specification of agreements for the Log Control Function.

5.8 Security Alarm Reporting Function Agreements

5.8.1 General Agreements

These agreements require support for the SMF services defined by the security alarm reporting standard [SARF].

These agreements also require conformance to the abstract syntaxes identified in clause 11 of the alarm reporting standard [SARF] and specified in [DMI], with the exception of event record subclass. If support for the log control standard [LCF] as described in clause 5.7 is claimed, then all [SARF] event record subclasses shall also be required by these agreements. These agreements permit optional negotiation of the security alarm reporting function as specified in section 10 of [SARF].

5.8.2 Security Alarm Reporting

This subclause provides agreements pertinent to the Security Alarm Reporting SMF service defined by section 9.2 of [SARF]. Subclause 6 provides agreements pertinent to CMIS services and pass-through parameters used by this SMF service.

Table 1 - Agreements on parameter usage pertinent to the Security Alarm Reporting SMF service

SMF Security Alarm Reporting parameter	Req	Rsp	SMF agreements
Event Type	M	C(=)	
Event Information			
Security Alarm Cause	M	-	
Security Alarm Severity	M	-	
Security Alarm Detector	M	-	[1]
Service User	M	-	
Service Provider	M	-	
Notification Identifier	U	-	5.1.2.1
Correlated Notifications	U	-	5.1.2.2
Additional Text	U	-	5.1.2.3
Additional Info	U	-	5.1.2.2, 5.1.2.4

- [1] To avoid ambiguity, the Distinguished Name form of this parameter shall be implemented and may be used. Use of Local Distinguished Name and Non-Specific forms are beyond the scope of these agreements. If an implementation is unable to decode or understand the semantics of this parameter, an appropriate CMIS error (i.e., Invalid Attribute Value) shall be returned.

5.9 Security Audit Trail Function Agreements

5.9.1 General Agreements

These agreements require support for the SMF services defined by the security audit trail standard [SATF].

These agreements also require conformance to the abstract syntaxes identified in clause 11.2 of the security audit trail standard [SATF] and specified in [DMI], with the exception of event log record subclass. If support for the log control standard [LCF] as described in clause 5.7 is claimed, then all [SATF] event log record subclasses shall also be required by these agreements.

5.9.2 Security Audit Trail Reporting SMF Service

This subclause provides agreements pertinent to the Security Audit Trail Reporting SMF service defined by section 9.2 of [SATF]. Clause 6 provides agreements pertinent to CMIS services and pass-through parameters used by this SMF service.

Table 2 - Agreements on parameter usage pertinent to the Security Audit Trail Reporting SMF service

SMF Security Audit Trail parameter	Req	Rsp	SMF agreements
Event Type	M	C(=)	5.9.2.1
Event Information			
Service Report Cause	C(1)	-	
Notification Identifier	U	-	5.1.2.3
Correlated Notifications	U	-	5.1.2.4
Additional Text	U	-	5.1.2.5
Additional Info	U>I	-	5.1.2.6

C(1): Mandatory (M) for serviceReport

5.9.2.1 Notifications

These Implementors' Agreements require support for both the serviceReport and usageReport notification types.

5.9.3 Security Audit Trail Record

This subclause is a placeholder for agreements pertaining to the Security Audit Trail Record (SATR) managed object class.

5.10 Objects and Attributes for Access Control Agreements

(Refer to the Working Implementation Agreements Document.)

5.11 Accounting Meter Function Agreements

(Refer to the Working Implementation Agreements Document.)

5.12 Workload Monitoring Function Agreements

(Refer to the Working Implementation Agreements Document.)

5.13 Summarization Function Agreements

(Refer to the Working Implementation Agreements Document.)

5.14 Test Management Function Agreements

(Refer to the Working Implementation Agreements Document.)

5.15 Confidence and Diagnostic Test Classes Agreements

(Refer to the Working Implementation Agreements Document.)

6 Management Communications

This clause covers the agreements pertaining to the use of associations over which to conduct management communications, and agreements for management communication, itself, by reference to ISP 11183 [AOM1PT1, AOM1PT2, and AOM1PT3]. ISP 11183 defines two profiles, AOM11 (Basic Management Communications) [AOM1PT3] and AOM12 (Enhanced Management Communications) [AOM1PT2], and defines upper layer requirements [AOM1PT1] for each of these profiles.

For rigorous specification of the agreements relevant to clause 6, Management Communications, see ISP 11183 [AOM1PT1, AOM1PT2, and AOM1PT3].

6.1 Association Policies

Associations are established using the procedures described in [ACSEP].

6.1.1 Application Context Negotiation

These IAs specify the negotiation of the Systems management application context specified in [SMO]. Other application contexts are outside the scope of these agreements.

6.1.2 Functional Unit Negotiation

These IAs specify that System Management Functional Units are negotiated as specified in [SMO].

6.1.3 Security Aspects of Associations

The ACSE authentication mechanisms and associated data types shall be as defined in clause 9 (Upper Layers Security) of part 12 of the OIW Working Agreements.

Support of ACSE authentication is optional.

7 Management Information

This clause, which is based on ISO standards' documents [MIM] and [GDMO], contains agreements regarding basic concepts and modelling techniques related to management information. It enumerates agreements on (i) the information model (subclause 7.1) and (ii) guidelines for defining management information (subclause 7.2). These agreements apply to developers of contributions to the Management Information Library (MIL). They form a normative part of the standard; hence they must be strictly followed while defining management information. It is not within the scope of this clause to make agreements about specific elements of management information or to define such specific elements of management information. Such definitions and/or agreements can be obtained via the Management Information Library.

7.1 The Information Model

When modelling management information, these agreements require use of [MIM] with the following additional constraints.

7.1.1 Inheritance

The following constraint related to inheritance is enforced in order to remove potential ambiguities:

During the lifetime of a managed object instance, each of its attributes must have a value that is valid for the attribute syntax of that attribute.

7.1.2 Interoperability

7.1.2.1 Interoperability Provided By The Agent System

Allomorphism, as specified in clause 5.2.3.1 of [MIM], is out of scope. Any other specification within the [MIM] or [GDMO] that refers to allomorphism is also out of scope.

7.1.2.2 Interoperability Provided By The Manager System

The semantics of clause 5.2.3.2 of [MIM] are supported. A manager system can supply the object identifier as specified in clause 7.4.5 of [GDMO] to specify that a managed object should perform an operation as a member of its actual class. The object identifier is intended to be used in requests only, and shall be interpreted by the responder as a requirement to return its real object class value in the response. Agent systems shall support this object identifier as defined in [MIM] 5.2.3.2 and [GDMO] 7.4.5.

7.1.3 Filter

The concept of filter is supported as specified in clause 6. Restrictions on its usage are specified in subclause 6.2.2.2 of these agreements.

7.1.4 Management Operations

An implementation that complies with these agreements shall support management operations as defined in clause 5.3.4 of [MIM] with the following additional clarification.

[MIM] clause 5.3.4.1 (2), [DMI] clause 6.14, and [GDMO] clause 6.1.4 imply that the object class attribute shall not be included in the create request Attribute List parameter. [MIM] states that any conflicting duplicate specifications cause the request to fail.

7.1.5 Deletion of Objects Containing Objects

The error 'Processing Failure' shall be returned if a managed object has existing contained objects and the behavior defined for that object prohibits its deletion unless all contained objects have been deleted.

7.2 Guidelines for the Definition of Management Information

This subclause contains agreements about guidelines for the definition of management information, as specified in [GDMO].

7.2.1 Syntactical Definitions of Management Information

7.2.1.1 Attribute Template

The following constraint applies to the Attribute Template specified in clause 9.7.2 of [GDMO]:

The BEHAVIOUR construct may be omitted only if a behaviour definition has been inherited from the parent attribute, i.e., the attribute is derived from another attribute whose definition contains a BEHAVIOUR construct.

7.2.2 Guidelines For Defining Behaviour

The following details should be provided in the set of specifications defining a managed object class:

- a) a textual description of the network/system resource(s) the managed object class represents, including their functional role;
- b) a description of the relationships that can occur between different instances of the managed object class being defined, as well as those that can occur between instances of the managed object class being defined and instances of other managed object classes;
- c) a description of the operations that are supported by the managed object class, with precise definition of the effects, side effects if any, constraints, response notifications, failure modes;
- d) specification of how instances of this managed object class are created and deleted, particularly whether they can be created/deleted via the management CREATE/DELETE operations;
- e) a description of notifications that can be generated, the conditions that generate them (e.g., crossing of a threshold), their contents and side-effects, if any. In particular, identify all the attributes that are subject to the AttributeChange and StateChange notifications, if these notifications are supported;
- f) other constraints, including those involving other managed object classes.

7.2.3 Other Guidelines

The Systems Management functions have defined various attributes and events, as indicated in clause 5 of these agreements. Object definers should make use of these attributes and events wherever applicable.

8 Conformance

8.1 Introduction

Clause 8 specifies the conformance requirements for the OIW Network Management Implementation Agreements (IAs). Implementors of products will provide claims of conformance to these requirements. These claims will be in the form of Protocol Implementation Conformance Statements (PICS) and Managed Object Conformance Statements (MOCS). These requirements will also be used to develop test cases which will be used to validate claims of conformance. This clause defines the general conformance requirements and criteria which shall be used as a basis for tests of implementations claiming conformance to these agreements. Dependent conformance requirements are defined in the context in which they are used (e.g., SMF general conformance requirements include CMIP dependent conformance requirements for CMIS services used).

Editor's Note: [The use of the two terms, "general conformance class" and "dependent conformance class", is under review. When a final answer to Question Q1/49.9 (on the long term solution to general and dependent conformance) has been approved, it is intended to clarify and/or correct this conformance section.]

(Refer to the Working Implementation Agreements Document for additional introductory text.)

8.2 General Requirements of Conformance

Conformance for these agreements is designed to specify a well-defined set of management capabilities and features. For the purposes of organization and clarity of these agreements, management has been divided into three categories. Clauses 5 (Management Functions and Services), 6 (Management Communications) and 7 (Management Information) state the agreements which respectively comprise three conformance categories. Within these categories, particular conformance categories are specified which delineate conformance requirements for a well-defined and bounded set of management capabilities and features (e.g., within the Management Functions and Services conformance categories, a conformance category is specified which defines conformance to Alarm Reporting and State Management Services). Once a conformance category is delineated which specifies the set of requirements for that category, tests can be developed to evaluate conformance of products to that conformance category. And finally, for some conformance categories, roles (Manager, Agent, or both) are specified. One or more roles may be supported for those conformance categories to which an implementation is conformant.

The development of conformance categories will enable:

- a) users to define procurement specifications;
- b) vendors to define management capabilities and features;
- c) conformance test houses and others to define test cases.

To be conformant to the IAs, an implementation shall be conformant to at least one of the following categories:

- a) Management Communication;
- b) Management Functions and Services;
- c) Management Information.

Implementations which are conformant to these categories shall comply with the requirements stated in the following clause.

8.3 Specific Conformance Categories

8.3.1 Management Communication Categories

To be conformant to the Management Communication categories, an implementation shall conform to agreements in clause 6. Conformance to management communication also requires an implementor to state which of the management communication profiles specified in clause 6 are supported in the implementation. The implementor's statement of which profile is supported shall be indicated in a CMIP PICS as follows. The implementor shall complete the PICS proforma as specified by one of the profiles specified in clause 6.

Note: [Conformance requirements for these IAs, relating to services required of the upper layers and other ASEs, are discussed in part 5, clause 13.7]

8.3.2 Management Functions and Services Conformance Categories

To be conformant to the Management Functions and Services categories, an implementation shall conform to the agreements in clause 5 on at least one of the categories defined below in either a manager role, an agent role or both roles. [Note: These categories are aligned with the proposed AOM2x Profiles for Systems Management Functions.] [NMSG1] Conformance to agreements in clause 5 requires conformance to referenced ISO standards/CCITT Recommendations and to all other clauses referenced in 5, including dependent conformance to the underlying services required by the SMFs.

The implementor shall state which of the following conformance categories are supported. For each category, the implementor shall complete the related PICS and MOCS proformas to indicate which functional unit(s) and role(s) are supported.

8.3.2.1 General Management Capabilities Conformance Category

Note: [This category corresponds to proposed profile AOM211 [AOM211].]

Conformance to the General Management Capabilities Conformance Category requires general conformance to the Object Management Function [OMF], general conformance to the State Management Function [STMF], general conformance to the Attributes for Representing Relationships Function [ARR], and general conformance to the Alarm Reporting Function [ARF]. To be conformant to the Object Management Function, an implementation shall conform to the requirements stated in [OMF]. In addition, an implementation shall conform to clause 5.2 of these agreements and all other clauses referenced in 5.2. To be conformant to the State Management Function, an implementation shall conform to the requirements stated in [STMF]. In addition, an implementation shall conform to clause 5.3 of these agreements and all other clauses referenced in 5.3. To be conformant with the Attributes for Representing Relationships Function, an implementation shall conform to the requirements stated in [ARR]. In addition, an implementation shall conform to clause 5.4 of these agreements and all other clauses referenced in 5.4. To be conformant to the Alarm Reporting Function, an implementation shall conform to the requirements stated in [ARF]. In addition, an implementation shall conform to clause 5.5 of these agreements and all clauses referenced in 5.5.

8.3.2.2 Alarm Reporting and State Management Capabilities Conformance Category

Note: [This category corresponds to proposed profile AOM212 [AOM212].]

Conformance to the Alarm Reporting and State Management Capabilities Conformance Category requires general conformance to the State Management Function [STMF], general conformance to the Alarm Reporting Function [ARF], and dependent conformance to the Object Management Function [OMF]. To be conformant to the State Management Function, an implementation shall conform to the requirements stated in [STMF]. In addition, an implementation shall conform to clause 5.3 of these agreements and all other clauses referenced in 5.3. To be conformant to the Alarm Reporting Function, an implementation shall conform to the requirements stated in [ARF]. In addition, an implementation shall conform to clause 5.5 of these agreements and all clauses referenced in 5.5.

Dependent conformance to the Object Management Function required by the Alarm Reporting and State Management Capabilities Conformance Category requires support for the PT-SET and PT-GET elements of procedure in clauses 11.1.6 and 11.1.7 of [OMF] in either the agent role, the manager role, or both roles as specified by the implementor in the PICS. In addition, an implementation shall conform to clause 5.2.7 and clause 5.2.9 of these agreements and all clauses referenced in 5.2.7 and 5.2.9. The implementation need only support the PT-SET and PT-GET elements of procedure as applied to the State Management Attributes identified in [STMF] and specified in [DMI]. An implementation shall also conform to the notifications identified in [STMF] and specified in [DMI].

For each role claimed to be supported in the PICS, an implementation shall support the transfer syntax derived from the encoding rules defined in [BER] named [joint-iso-ccitt asn1(1) basic encoding(1)], for the purpose of generating and interpreting the MAPDUs required to support that portion of the "CMIP-PCI" abstract syntax defined in [CMIP] required to support the PT-GET and PT-SET elements of procedure as defined in clauses 11.1.6 and 11.1.7 of [OMF].

The implementation shall support the transfer syntax derived from the encoding rules specified in [BER] named [joint-iso-ccitt asn1(1) basic encoding(1)], for the purpose of generating and interpreting the MAPDUs defined by the abstract data types referenced in 11.2.6 of [STMF].

8.3.2.3 Alarm Reporting Capabilities Conformance Category

Note: [This category corresponds to proposed profile AOM213 [AOM213].]

Conformance to the Alarm Reporting Capabilities Conformance Category requires general conformance to the Alarm Reporting Function [ARF]. To be conformant to the Alarm Reporting Function, an implementation shall conform to the requirements stated in [ARF]. In addition, an implementation shall conform to clause 5.5 of these agreements and all clauses referenced in 5.5.

8.3.2.4 General Event Report Management Conformance Category

Note: [This category corresponds to proposed profile AOM221 [AOM221].]

Conformance to the General Event Report Management Conformance Category requires general conformance to the Event Report Management Function [ERMF], dependent conformance to the Object Management Function [OMF], and dependent conformance to the State Management Function [STMF]. To be conformant to the Event Report Management Function, an implementation shall conform to the requirements stated in [ERMF]. In addition, an implementation shall conform to clause 5.6 of these agreements and all clauses referenced in 5.6.

Dependent conformance to the Object Management Function required by the General Event Report Management Conformance Category requires support for the PT-SET, PT-GET, PT-CREATE, PT-DELETE, object creation reporting, object deletion reporting, and attribute value change reporting elements of procedure in clauses 11.1.1 through 11.1.7 of [OMF] in either the agent role, the manager role, or both roles as specified by the implementor in the PICS. In addition, an implementation shall conform to clause 5.2.2 through clause 5.2.7, and clause 5.2.9 of these agreements and all clauses referenced in these clauses. An implementation shall also conform to the notifications identified in [OMF] and specified in [DMI].

Dependent conformance to the State Management Function required by the General Event Report Management Conformance Category requires support for the state change reporting elements of procedure in clause 11.1 of [STMF] in either the agent role, the manager role, or both roles as specified by the implementor in the PICS. In addition, an implementation shall conform to clause 5.3.2 of these agreements and all clauses referenced by clause 5.3.2. An implementation shall also conform to the notifications identified in [STMF] and specified in [DMI].

For each role claimed to be supported in the PICS, an implementation shall support the transfer syntax derived from the encoding rules defined in [BER] named [joint-iso-ccitt asn1(1) basic encoding(1)], for the purpose of generating and interpreting the MAPDUs required to support that portion of the "CMIP-PCI" abstract syntax defined in [CMIP] required to support the PT-SET, PT-GET, PT-CREATE, PT-DELETE, object creation reporting, object deletion reporting, and attribute value change reporting elements of procedure as defined in clauses 11.1.1 through 11.1.7 of [OMF].

The implementation shall support the transfer syntax derived from the encoding rules specified in [BER] named [joint-iso-ccitt asn1(1) basic encoding(1)], for the purpose of generating and interpreting the MAPDUs defined by the abstract data types referenced in 11.2.5 of [OMF].

For each role claimed to be supported in the PICS, an implementation shall support the transfer syntax derived from the encoding rules defined in [BER] named [joint-iso-ccitt asn1(1) basic encoding(1)], for the purpose of generating and interpreting the MAPDUs required to support that portion of the "CMIP-PCI" abstract syntax defined in [CMIP] required to support the state change reporting elements of procedure as defined in clause 11.1 of [STMF].

The implementation shall support the transfer syntax derived from the encoding rules specified in [BER] named [joint-iso-ccitt asn1(1) basic encoding(1)], for the purpose of generating and interpreting the MAPDUs defined by the abstract data types referenced in 11.2.6 of [STMF].

8.3.2.5 General Log Control Conformance Category

Note: [This category corresponds to proposed profile AOM231 [AOM231].]

Conformance to the Log Control Conformance Category requires general conformance to the Log Control Function [LCF], dependent conformance to the Object Management Function [OMF], dependent conformance to the State Management Function [STMF] and dependent conformance to the Alarm Reporting Function [ARF]. To be conformant to the Log Control Function, an implementation shall conform to the requirements stated in [LCF]. In addition, an implementation shall conform to clause 5.7 of these agreements and all clauses referenced in 5.7.

Dependent conformance to the Object Management Function required by the General Log Control Conformance Category requires support for the PT-SET, PT-GET, PT-CREATE, PT-DELETE, object creation reporting, object deletion reporting, and attribute value change reporting elements of procedure in clauses 11.1.1 through 11.1.7 of [OMF] in either the agent role, the manager role, or both roles as specified by the implementor in the PICS. In addition, an implementation shall conform to clause 5.2.2 through clause 5.2.7, and clause 5.2.9 of these agreements and all clauses referenced in these clauses. An implementation shall also conform to the notifications identified in [OMF] and specified in [DMI].

Dependent conformance to the State Management Function required by the General Log Control Conformance Category requires support for the state change reporting elements of procedure in clause 11.1 of [STMF] in either the agent role, the manager role, or both roles as specified by the implementor in the PICS. In addition, an implementation shall conform to clause 5.3.2 of these agreements and all clauses referenced by clause 5.3.2. An implementation shall also conform to the notifications identified in [STMF] and specified in [DMI].

Dependent conformance to the Alarm Reporting Function required by the General Log Control Conformance Category requires support for the alarm reporting elements of procedure in clause 11.1 of [ARF] in either the agent role, the manager role, or both roles as specified by the implementor in the PICS. In addition, an implementation shall conform to clause 5.5.2 of these agreements and all clauses referenced by clause 5.5.2. An implementation shall also conform to the notifications identified in [ARF] and specified in [DMI].

For each role claimed to be supported in the PICS, an implementation shall support the transfer syntax derived from the encoding rules defined in [BER] named [joint-iso-ccitt asn1(1) basic encoding(1)], for the purpose of generating and interpreting the MAPDUs required to support that portion of the "CMIP-PCI" abstract syntax defined in [CMIP] required to support the PT-SET, PT-GET, PT-CREATE, PT-DELETE, object creation reporting, object deletion reporting, and attribute value change reporting elements of procedure as defined in clauses 11.1.1 through 11.1.7 of [OMF].

The implementation shall support the transfer syntax derived from the encoding rules specified in [BER] named [joint-iso-ccitt asn1(1) basic encoding(1)], for the purpose of generating and interpreting the MAPDUs defined by the abstract data types referenced in 11.2.5 of [OMF].

For each role claimed to be supported in the PICS, an implementation shall support the transfer syntax derived from the encoding rules defined in [BER] named [joint-iso-ccitt asn1(1) basic encoding(1)], for the purpose of generating and interpreting the MAPDUs required to support that portion of the "CMIP-PCI" abstract syntax defined in [CMIP] required to support the state change reporting elements of procedure as defined in clause 11.1 of [STMF].

The implementation shall support the transfer syntax derived from the encoding rules specified in [BER] named [joint-iso-ccitt asn1(1) basic encoding(1)], for the purpose of generating and interpreting the MAPDUs defined by the abstract data types referenced in 11.2.6 of [STMF].

For each role claimed to be supported in the PICS, an implementation shall support the transfer syntax derived from the encoding rules defined in [BER] named [joint-iso-ccitt asn1(1) basic encoding(1)], for the purpose of generating and interpreting the MAPDUs required to support that portion of the "CMIP-PCI" abstract syntax defined in [CMIP] required to support the alarm reporting elements of procedure as defined in clause 11.1 of [ARF].

The implementation shall support the transfer syntax derived from the encoding rules specified in [BER] named [joint-iso-ccitt asn1(1) basic encoding(1)], for the purpose of generating and interpreting the MAPDUs defined by the abstract data types referenced in 11.2.5 of [ARF].

8.3.3 Management Information Conformance Category

To be conformant to the Management Information Conformance Category, an implementation shall include at least one managed object defined as specified by clause 7. The requirements for managing this managed object shall not conflict with the specifications in clauses 5 and 6. Managed object class definitions shall be provided either in full or by reference. Registered object identifiers shall be associated with any such managed object class definition and supporting definitions (e.g., attributes, name bindings). All mandatory abstract syntaxes and semantics associated with those identifiers shall be used. Note that all managed objects and supporting definitions in Annex A satisfy these conformance requirements.

An implementation is conformant to a managed object class definition if it supports all the mandatory packages specified in the managed object class as well as all associated information (e.g., attributes, notifications, actions, parameters) referenced in these packages and at least one name binding that may be used to support the naming of instances of this managed object class. Although it is not necessary to be conformant to all superior object classes in the containment tree of an instance of a conformant managed object class, all name bindings and naming attributes necessary to access that object instance shall be publicly available.

8.3.3.1 MOCS Proforma

The implementor shall provide a statement specifying which managed object classes are supported. A MOCS proforma shall be completed by the implementor for each managed object class supported.

Editor's Note: [The CD Version of ISO/IEC 10165-6 (Requirements and Guidelines for Implementation Conformance Statement Proformas Associated with Management Information) is now available. MOCS Proformas for each managed object class supported should be developed consistent with 10165-6 [MOCS].]

For each managed object class supported, the following shall be supplied:

- a) a statement of pragmatic constraints (e.g., attribute values/ranges, initial values) supported, unless such constraints are defined in the managed object class definition;
- b) a statement of conditional packages supported;
- c) a statement of role(s) (manager, agent, or both) in which the object class definition is supported.

Editor's Note: [CD 10165-6 does not currently distinguish roles.]

8.3.4 Management Application Contexts

The implementation shall support at least the application context for systems management defined in ISO/IEC 10040 [SMO].

Note: [Such a statement is required by [SMO] clause 7.2.]

Note: [Such a statement is required by part 5, clause 13.7, which discusses conformance requirements for these IAs, as related to services required of the upper layers and other ASEs.]

8.4 Demonstration of Conformance

(Refer to the Working Implementation Agreements Document.)

8.4.1 Management Communication

(Refer to the Working Implementation Agreements Document.)

8.4.2 Management Functions and Services

(Refer to the Working Implementation Agreements Document.)

8.4.3 Management Information

(Refer to the Working Implementation Agreements Document.)

Annex A (informative)

Management Information Library (MIL)

(Refer to the Working Implementation Agreements Document for additional information.)

A.1 Introduction

(Refer to the Working Implementation Agreements Document.)

A.2 Rules and Procedures

(Refer to the Working Implementation Agreements Document.)

A.3 General Guidelines

(Refer to the Working Implementation Agreements Document.)

A.4 Harmonized Library

The definitions specified in this clause can be referenced by using the label "OP1 Library Vol. 1" (e.g., "OP1 Library Vol. 1":computerSystem).

By inclusion of the managed object (MO) definitions and the object identifiers in Annex A and Annex B, respectively, of the Stable Implementors' Agreements (SIAs), these managed object (MO) definitions have become formally registered. Implementors of part 18 of the SIAs do not have to support any of these MOs. However, even though Annex A and Annex B are informative annexes, any implementation that claims to conform to these definitions must treat these definitions as normative and comply with the relevant portions of Annex A.4 and A.5, and Annex B.

A.4.1 Managed Object Classes and Mandatory Packages

A.4.1.1 Computer System

computerSystem MANAGED OBJECT CLASS

DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2 : 1992":top;

CHARACTERIZED BY computerSystemPkg;

CONDITIONAL PACKAGES

peripheralNamePkg	PRESENT IF !an instance supports it and the peripheralListPkg is NOT present!,
peripheralListPkg	PRESENT IF !an instance supports it and the peripheralNamePkg is NOT present!,
processingEntityNamePkg	PRESENT IF !an instance supports it and the processingEntityListPkg is NOT present!,
processingEntityListPkg	PRESENT IF !an instance supports it and the processingEntityNamePkg is NOT present!,

```

systemTimePkg      PRESENT IF !an instance supports it!,
upTimePkg          PRESENT IF !an instance supports it!,
"Rec. M.3100 : 1992":userLabelPackage
                    PRESENT IF !an instance supports it!,
usageStatePkg      PRESENT IF !resource can detect usage!;

```

```
REGISTERED AS {x-objectClass 1};
```

```

computerSystemPkg      PACKAGE
  BEHAVIOUR computerSystemPkgDefinition,
              computerSystemPkgBehaviour;
  ATTRIBUTES
    computerSystemId GET,
    "Rec. X.721 | ISO/IEC 10165-2 : 1992":operationalState GET,
    "Rec. X.721 | ISO/IEC 10165-2 : 1992":administrativeState GET-REPLACE,
    "Rec. X.721 | ISO/IEC 10165-2 : 1992":alarmStatus GET-REPLACE ADD-REMOVE,
    "Rec. X.721 | ISO/IEC 10165-2 : 1992":availabilityStatus GET;

  ATTRIBUTE GROUPS
    "Rec. X.721 | ISO/IEC 10165-2 : 1992":state
    "Rec. X.721 | ISO/IEC 10165-2 : 1992":administrativeState
    "Rec. X.721 | ISO/IEC 10165-2 : 1992":operationalState
    "Rec. X.721 | ISO/IEC 10165-2 : 1992":alarmStatus
    "Rec. X.721 | ISO/IEC 10165-2 : 1992":availabilityStatus;

  NOTIFICATIONS
    "Rec. X.721 | ISO/IEC 10165-2 : 1992":objectCreation,
    "Rec. X.721 | ISO/IEC 10165-2 : 1992":objectDeletion,
    "Rec. X.721 | ISO/IEC 10165-2 : 1992":attributeValueChange,
    "Rec. X.721 | ISO/IEC 10165-2 : 1992":stateChange,
    "Rec. X.721 | ISO/IEC 10165-2 : 1992":processingErrorAlarm,
    "Rec. X.721 | ISO/IEC 10165-2 : 1992":environmentalAlarm,
    "Rec. X.721 | ISO/IEC 10165-2 : 1992":equipmentAlarm;;

```

```
computerSystemPkgDefinition      BEHAVIOUR
```

```
DEFINED AS
```

The Computer System managed object class represents the aggregate of components which, when considered as a whole, is capable of performing data processing, storage, and retrieval functions. In order to perform its function, the computer system may have a variety of components including processing entities, terminals, disk drives, printers, etc.

The Computer System is intended to represent an aggregation of other objects, and can model either self-contained computer systems or computer systems which are physically distributed, possibly over a wide geographical area. An instance of the Computer System managed object class may have subordinate managed objects representing the individual entities within the computer system. Examples are entities such as disks, operating systems and processing entities.

Since the Computer System may be physically distributed, it is not appropriate to model the computer system managed object class as a subclass of the Equipment managed object class (since Equipment implies a single physical location through its location attribute). However, there can be cases where the Computer System is not physically distributed, in which case a Name Binding allowing Computer System to be named by OMNIPoint Equipment is permissible.

It is not appropriate to model Computer System as a subclass of the DMI System managed object class. Unlike Computer System, the DMI System is a "container" object class which is instantiated in managed systems and exists mainly to name the managed and support objects it makes visible.!

```
computerSystemPkgBehaviour      BEHAVIOUR
```

```
DEFINED AS
```

!A value for the computerSystemId attribute can only be provided when the object is created. Furthermore, this attribute value may not change once the managed object has been instantiated. Thus, this attribute is never the subject of an AttributeValueChange Notification.

Conditions under which an AttributeValueChange Notification is emitted are stated in the behaviour of the appropriate package or attribute. In the absence of such a statement in the behaviour, the attribute does not cause an AttributeValueChange notification to be emitted. All attributeValueChange notifications shall include the Attribute Identifier List parameter.

The stateChange notification is emitted when any of the following attributes change in value: administrativeState, operationalState, and availability status.

The stateChange notification is not emitted when the alarmStatus attribute changes value. (This is to avoid duplication of notifications.)

Since every combination of state attribute values may not be appropriate for particular kinds of computer systems, only appropriate combinations need be supported.

The processingErrorAlarm notification is emitted when the computerSystem resource experiences any of the alarm conditions defined by ISO/IEC 10164-4 (e.g., storage capacity problem, version mismatch, corrupt data, software error, underlying resource unavailable).!;

A.4.1.2 Connection Oriented Transport Protocol Layer Entity

coTransportProtocolLayerEntity MANAGED OBJECT CLASS

DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2 : 1992":top;

CHARACTERIZED BY coTransportProtocolLayerEntityPkg;

CONDITIONAL PACKAGES

manufacturerListPkg	PRESENT IF !an instance supports it and the manufacturerNamePkg is NOT present!;
manufacturerNamePkg	PRESENT IF !an instance supports it and the manufacturerListPkg is NOT present!;
productLabelPkg	PRESENT IF !an instance supports it!;
opVersionPkg	PRESENT IF !an instance supports it!;
serialNumberPkg	PRESENT IF !an instance supports it!;
typeTextPkg	PRESENT IF !an instance supports it!;
upTimePkg	PRESENT IF !an instance supports it!;
incomingProtocolErrorPkg	PRESENT IF !an instance supports it!;
outgoingProtocolErrorPkg	PRESENT IF !an instance supports it!;
checksumPDUsDiscardedPkg	PRESENT IF !an instance supports it!;
maxPDUSizeIVPkg	PRESENT IF !the "OP1 Library Vol. 2 : 1992":transport ConnectionIVMO object class is not used to provide this initial value!;
usageStatePkg	PRESENT IF !resource can detect usage!;

REGISTERED AS {x-objectClass 2};

coTransportProtocolLayerEntityPkg PACKAGE

BEHAVIOUR coTransportProtocolLayerEntityPkgDefinition,
coTransportProtocolLayerEntityPkgBehaviour;

ATTRIBUTES

coTransportProtocolLayerEntityId PERMITTED VALUES SYNTAX-1.GraphicString64 GET,
transportEntityType GET,
localTransportAddresses GET,


```

activeConnections PERMITTED VALUES SYNTAX-1.Integer32 GET,
maxConnections PERMITTED VALUES SYNTAX-1.Integer32 GET,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":administrativeState GET-REPLACE,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":operationalState GET,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":alarmStatus GET-REPLACE ADD-REMOVE,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":outgoingConnectionRequestsCounter
PERMITTED VALUES SYNTAX-1.Integer32 GET,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":incomingConnectionRequestsCounter
PERMITTED VALUES SYNTAX-1.Integer32 GET,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":outgoingConnectionRejectErrorCounter
PERMITTED VALUES SYNTAX-1.Integer32 GET,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":incomingConnectionRejectErrorCounter
PERMITTED VALUES SYNTAX-1.Integer32 GET,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":outgoingDisconnectErrorCounter
PERMITTED VALUES SYNTAX-1.Integer32 GET,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":incomingDisconnectErrorCounter
PERMITTED VALUES SYNTAX-1.Integer32 GET,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":incomingDisconnectCounter
PERMITTED VALUES SYNTAX-1.Integer32 GET,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":outgoingDisconnectCounter
PERMITTED VALUES SYNTAX-1.Integer32 GET,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":octetsSentCounter
PERMITTED VALUES SYNTAX-1.Integer32 GET,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":octetsReceivedCounter
PERMITTED VALUES SYNTAX-1.Integer32 GET;

```

ATTRIBUTE GROUPS

```

"Rec. X.721 | ISO/IEC 10165-2 : 1992":state
"Rec. X.721 | ISO/IEC 10165-2 : 1992":administrativeState
"Rec. X.721 | ISO/IEC 10165-2 : 1992":operationalState
"Rec. X.721 | ISO/IEC 10165-2 : 1992":alarmStatus;

```

ACTIONS activate, deactivate;

NOTIFICATIONS

```

"Rec. X.721 | ISO/IEC 10165-2 : 1992":objectCreation,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":objectDeletion,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":attributeValueChange,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":stateChange,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":processingErrorAlarm;;

```

coTransportProtocolLayerEntityPkgDefinition BEHAVIOUR

DEFINED AS

!The coTransportProtocolLayerEntity managed object class represents an instantiation of any connection-oriented transport layer protocol (e.g., the ISO Transport Protocol layer or the Internet Transmission Control Protocol (TCP) Layer). The transport protocol layer is layer four of the OSI Reference model. It provides for the transparent transference of data between two peer entities. It relieves its users from any concerns about the detailed way in which supporting communication media are utilized to achieve this transfer. The connection-oriented transport protocol layer entity makes use of a transport connection for the purpose of transferring data.

This is a generally applicable managed object class, in that it does not represent any specific connection-oriented transport protocol - rather it contains characteristics common across various different connection-oriented transport layer protocols. This managed object class is not intended to override any transport layer managed object classes defined in ISO. It provides a high level view of a connection-oriented transport layer protocol and complements the protocol-specific views being defined in the standards.!

coTransportProtocolLayerEntityPkgBehaviour BEHAVIOUR

DEFINED AS

!Conditions under which an attributeValueChange notification is emitted are stated in the behaviour of the appropriate package or attribute. In the absence of such a statement, in the behaviour, the attribute does not cause an attributeValueChange to Be emitted.

The attributeValueChange notification is emitted when any of the following attributes change in value: localTransportAddresses, maxConnections, transportEntityType, and all counter attributes (only when they wrap). All attributeValueChange notifications shall include the Attribute Identifier List parameter. All attributeValueChange notifications which report counter attribute wraps shall contain the maximum counter attribute value in the Old Attribute Value parameter.

The stateChange notification is emitted when any of the following attributes change in value: administrativeState and operationalState.

The processingErrorAlarm notification is emitted when the coTransportProtocolLayerEntity resource experiences any of the alarm conditions defined by ISO/IEC 10164-4 (e.g., storage capacity problem, version mismatch, corrupt data, software error, underlying resource unavailable).!;

This is a generally applicable managed object class, in that it does not represent any specific connection-oriented transport protocol. ISO/IEC 10733 [TLM] defines specific objects for managing OSI transport protocol layer entities.

A.4.1.3 Connectionless Network Protocol Layer Entity

clNetworkProtocolLayerEntity MANAGED OBJECT CLASS

DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2 : 1992": top;

CHARACTERIZED BY clNetworkProtocolLayerEntityPkg;

CONDITIONAL PACKAGES

manufacturerListPkg	PRESENT IF !an instance supports it and the manufacturerNamePkg is NOT present!,
manufacturerNamePkg	PRESENT IF !an instance supports it and the manufacturerListPkg is NOT present!,
productLabelPkg	PRESENT IF !an instance supports it!,
opVersionPkg	PRESENT IF !an instance supports it!,
serialNumberPkg	PRESENT IF !an instance supports it!,
typeTextPkg	PRESENT IF !an instance supports it!,
upTimePkg	PRESENT IF !an instance supports it!;

REGISTERED AS {x-objectClass 3};

clNetworkProtocolLayerEntityPkg PACKAGE

BEHAVIOUR clNetworkProtocolLayerEntityPkgDefinition,
 clNetworkProtocolLayerEntityPkgBehaviour;

ATTRIBUTES

clNetworkProtocolLayerEntityId PERMITTED VALUES SYNTAX-1.GraphicString64 GET,
networkEntityType GET,
localNetworkAddresses GET-REPLACE ADD-REMOVE,
nPDUTimeToLive PERMITTED VALUES SYNTAX-1.Integer32 GET-REPLACE,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":administrativeState GET-REPLACE,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":operationalState GET,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":alarmStatus GET-REPLACE ADD-REMOVE,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":pdusSentCounter
 PERMITTED VALUES SYNTAX-1.Integer32 GET,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":pdusReceivedCounter
 PERMITTED VALUES SYNTAX-1.Integer32 GET,


```

"Rec. X.721 | ISO/IEC 10165-2 : 1992":octetsSentCounter
                                PERMITTED VALUES SYNTAX-1.Integer32 GET,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":octetsReceivedCounter
                                PERMITTED VALUES SYNTAX-1.Integer32 GET,
pdusForwardedCounter PERMITTED VALUES SYNTAX-1.Integer32 GET,
pdusReasmbldOKCounter PERMITTED VALUES SYNTAX-1.Integer32 GET,
pdusReasmbldFailCounter PERMITTED VALUES SYNTAX-1.Integer32 GET,
pdusDiscardedCounter PERMITTED VALUES SYNTAX-1.Integer32 GET;

```

ATTRIBUTE GROUPS

```

"Rec. X.721 | ISO/IEC 10165-2 : 1992":state
    "Rec. X.721 | ISO/IEC 10165-2 : 1992":administrativeState
    "Rec. X.721 | ISO/IEC 10165-2 : 1992":operationalState
    "Rec. X.721 | ISO/IEC 10165-2 : 1992":alarmStatus;

```

ACTIONS activate, deactivate;

NOTIFICATIONS

```

"Rec. X.721 | ISO/IEC 10165-2 : 1992":objectCreation,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":objectDeletion,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":attributeValueChange,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":processingErrorAlarm,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":communicationsAlarm,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":stateChange;;

```

clNetworkProtocolLayerEntityPkgDefinition BEHAVIOUR

DEFINED AS

!The clNetworkProtocolLayerEntity managed object class represents an instantiation of a connectionless network protocol layer. The network protocol layer provides network services for the transparent transfer of data between peer transport entities. It relieves the transport protocol layer from the need to know anything about the underlying network technologies used to achieve data transfer.

This is a generally applicable managed object class, in that it does not represent any specific connectionless network protocol; instead, it contains characteristics common across various different connectionless network layer protocols. This managed object class is not intended to override any network layer managed object classes defined in ISO. It provides a high level view of a connectionless network layer protocol and complements the protocol-specific views being defined in the standards.

An instance of this managed object class supports only one type of protocol.!

clNetworkProtocolLayerEntityPkgBehaviour BEHAVIOUR

DEFINED AS

!Conditions under which an attributeValueChange notification is emitted are stated in the behaviour of the appropriate package or attribute. In the absence of such a statement, in the behaviour, the attribute does not cause an attributeValueChange to be emitted.

The attributeValueChange notification is emitted when any of the following attributes change in value: networkEntityType, localNetworkAddresses, nPDUTimeToLive, and all counter attributes (only when they wrap). All attributeValueChange notifications shall include the Attribute Identifier List parameter. All attributeValueChange notifications which report counter attribute wraps shall contain the maximum counter attribute value in the Old Attribute Value parameter.

The stateChange notification is emitted when any of the following attributes change in value: administrativeState and operationalState.

The communicationsAlarm notification is emitted when the clNetworkProtocolLayerEntity resource experiences any of the alarm conditions defined by ISO/IEC 10164-4 (e.g., loss of signal, local

transmission error, remote transmission error). In particular, this notification is used to report when a data NPDU is discarded for any reason other than network congestion.

The processingErrorAlarm notification is emitted when the clNetworkProtocolLayerEntity resource experiences any of the alarm conditions defined by ISO/IEC 10164-4 (e.g., storage capacity problem, version mismatch, corrupt data, software error, underlying resource unavailable).l;

This is a generally applicable managed object class, in that it does not represent any specific connectionless network protocol. ISO/IEC 10737 [NLM] defines specific objects for managing OSI network protocol layer entities.

A.4.1.4 OMNIPoint Equipment

```
-- This definition is subclassed from CCITT M.3100 Equipment, adding the following items:
--
-- Mandatory AttributeChange, ObjectCreation, ObjectDeletion Notifications
-- Mandatory Environmental, Processing Error, and Equipment Alarm Notifications
-- Mandatory Administrative and Operational State Attributes and State Change Notification
-- CREATE/DELETE operations and behaviours (in name bindings)
-- Conditional Contact, Customer, Function, Manufacturer, OMNIPoint Network, Service, Software
-- and Vendor Name and List Packages
-- Conditional Product and Serial Number Packages
-- Conditional Type Text Package
-- Conditional Location Pointer Package
--
-- ANSI T1M1.5 concerns regarding physical vs. functional modelling were resolved by excluding the Forum
-- R1 Equipment Type attribute from the OMNIPoint definition. The TypeText, FunctionName, and/or
-- FunctionList attributes may be used to carry (as graphic strings or pointers) information concerning
-- the function(s) supported by the physical Equipment. It is expected that Forum R1 to OMNIPoint 1
-- mapping rules will define a translation between Forum R1 EquipmentType enumerations and these OMNIPoint
-- Equipment attributes.
```

opEquipment MANAGED OBJECT CLASS

DERIVED FROM "Rec. M.3100 : 1992":equipment;

CHARACTERIZED BY

```
opEquipmentPkg,
"Rec. M.3100 : 1992":createDeleteNotificationsPackage,
"Rec. M.3100 : 1992":attributeValueChangeNotificationPackage,
"Rec. M.3100 : 1992":stateChangeNotificationPackage,
"Rec. M.3100 : 1992":administrativeOperationalStatesPackage,
"Rec. M.3100 : 1992":environmentalAlarmPackage,
"Rec. M.3100 : 1992":processingErrorAlarmPackage,
"Rec. M.3100 : 1992":equipmentsEquipmentAlarmPackage;
```

CONDITIONAL PACKAGES

```
contactListPkg        PRESENT IF !an instance supports it and the
                       contactNamePkg is NOT present!,
contactNamePkg        PRESENT IF !an instance supports it and the
                       contactListPkg is NOT present!,
customerListPkg       PRESENT IF !an instance supports it and the
                       customerNamePkg is NOT present!,
customerNamePkg       PRESENT IF !an instance supports it and the
                       customerListPkg is NOT present!,
functionListPkg       PRESENT IF !an instance supports it and the
                       functionNamePkg is NOT present!,
functionNamePkg       PRESENT IF !an instance supports it and the
                       functionListPkg is NOT present!,
locationPointerPkg    PRESENT IF !an instance supports it and the
                       "Rec. M.3100 : 1992":
```

```

locationNamePackage is NOT present!,
manufacturerListPkg PRESENT IF !an instance supports it and the
manufacturerNamePkg PRESENT IF !an instance supports it and the
manufacturerListPkg is NOT present!,
opNetworkListPkg PRESENT IF !an instance supports it and the
opNetworkNamePkg PRESENT IF !an instance supports it and the
opNetworkListPkg is NOT present!,
opVersionPkg PRESENT IF !"Rec. M.3100 : 1992":
versionPackage is also present!,
productLabelPkg PRESENT IF !an instance supports it!,
serialNumberPkg PRESENT IF !an instance supports it!,
serviceListPkg PRESENT IF !an instance supports it and the
serviceNamePkg is NOT present!,
serviceNamePkg PRESENT IF !an instance supports it and the
serviceListPkg is NOT present!,
softwareListPkg PRESENT IF !an instance supports it and the
softwareNamePkg is NOT present!,
softwareNamePkg PRESENT IF !an instance supports it and the
softwareListPkg is NOT present!,
typeTextPkg PRESENT IF !an instance supports it!,
usageStatePkg PRESENT IF !resource can detect usage!,
vendorListPkg PRESENT IF !an instance supports it and the
"Rec. M.3100 : 1992":
vendorNamePackage is NOT present!;
```

REGISTERED AS {x-objectClass 4};

opEquipmentPkg PACKAGE

BEHAVIOUR opEquipmentPkgBehaviour;

-- opEquipmentPkgDefinition inherited from Rec. M.3100 Equipment

ATTRIBUTES

"Rec. M.3100 : 1992":equipmentId PERMITTED VALUES SYNTAX-1.EquipmentIdRange GET;

ATTRIBUTE GROUPS

"Rec. X.721 | ISO/IEC 10165-2 : 1992":state

"Rec. X.721 | ISO/IEC 10165-2 : 1992":administrativeState

"Rec. X.721 | ISO/IEC 10165-2 : 1992":operationalState;;

opEquipmentPkgBehaviour BEHAVIOUR

DEFINED AS -- inherited from Rec. M.3100 Equipment, with the following extensions:

!A value for the "Rec. M.3100 : 1992":equipmentId attribute can only be provided when the object is created. Furthermore, this attribute value may not change once the managed object has been instantiated. Thus, this attribute is never the subject of an AttributeValueChange Notification.

Conditions under which an AttributeValueChange Notification is emitted are stated in the behaviour of the appropriate package or attribute. In the absence of such a statement in the behaviour, the attribute does not cause an AttributeValueChange notification to be emitted.

All attributeValueChange notifications shall include the Attribute Identifier List parameter.

The processingErrorAlarm notification (if present) is emitted when the Equipment resource experiences any of the alarm conditions defined by ISO/IEC 10164-4 (e.g., storage capacity problem, version mismatch, corrupt data, software error, underlying resource unavailable).!;

A.4.1.5 OMNIPoint Network

-- This definition is subclassed from Rec. M.3100 Network, adding the following items:


```
--
-- Network Title and associated name binding to Root
-- AttributeChange, ObjectCreation, ObjectDeletion Notifications
-- CREATE/DELETE operations and behaviours (in name bindings)
```

```
opNetwork          MANAGED OBJECT CLASS
```

```
DERIVED FROM "Rec. M.3100 : 1992":network;
```

```
CHARACTERIZED BY opNetworkPkg;
```

```
REGISTERED AS {x-objectClass 5};
```

```
opNetworkPkg          PACKAGE
```

```
BEHAVIOUR opNetworkPkgBehaviour;
-- opNetworkPkgDefinition inherited from Rec. M.3100 Network
```

```
ATTRIBUTES
networkTitle          GET;
```

```
NOTIFICATIONS
"Rec. X.721 | ISO/IEC 10165-2 : 1992":objectCreation,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":objectDeletion,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":attributeValueChange;;
```

```
opNetworkPkgBehaviour BEHAVIOUR
```

```
DEFINED AS -- inherited from Rec. M.3100 Network, with the following extensions:
```

!Values for the Network Identifier and Network Title attributes can only be provided when the object is created. Furthermore, these attribute values may not change once the managed object has been instantiated. Thus, they are never the subject of an AttributeValueChange Notification. When NetworkTitle is used for naming, the Network Identifier attribute has a NULL value.

Conditions under which an AttributeValueChange Notification is emitted are stated in the behaviour of the appropriate package or attribute. In the absence of such a statement in the behaviour, the attribute does not cause an AttributeValueChange notification to be emitted. All attributeValueChange notifications shall include the Attribute Identifier List parameter.!

A.4.1.6 Processing Entity

```
processingEntity      MANAGED OBJECT CLASS
```

```
DERIVED FROM opEquipment;
```

```
CHARACTERIZED BY processingEntityPkg;
```

```
CONDITIONAL PACKAGES
```

```
addressingPkg          PRESENT IF !relevant to the underlying resource!,
cpuUtilizationPkg      PRESENT IF !an instance supports it!,
memorySizePkg          PRESENT IF !relevant to the underlying resource!,
memoryUtilizationPkg   PRESENT IF !an instance supports it!,
upTimePkg              PRESENT IF !an instance supports it!;
```

```
REGISTERED AS {x-objectClass 6};
```

```
processingEntityPkg PACKAGE
```

BEHAVIOUR processingEntityPkgDefinition,
processingEntityPkgBehaviour;

ATTRIBUTES

cpuType PERMITTED VALUES SYNTAX-1.GraphicString16 GET,
osInfo PERMITTED VALUES SYNTAX-1.OsInfoRange GET;;

processingEntityPkgDefinition BEHAVIOUR

DEFINED AS

!The processingEntity managed object class represents the physical portion of the computer system that performs a processing function, frequently called a Central Processing Unit (CPU). A Processing Entity may be composed of such components as arithmetical logical units (ALU), registers for processing memory, limited storage most often in the form of Random Access Memory (RAM), and various other types of memory used in the processing function. It does not include such components as disk drives, data bases, etc.

Some Processing Entities may have input/output channels, particularly when hardware is shared between elements of the Processing Entity. In other cases, the input/output must be seen as components of a superior managed object, for example a Computer System, or as OMNIPoint Equipment objects shared among several Computer Systems.

The cpuType attribute indicates the type of central processor unit found in the Processing Entity.

The osInfo attribute specifies the names and releases of the supported operating systems.!!

processingEntityPkgBehaviour BEHAVIOUR

DEFINED AS

!The AttributeValueChange notification is emitted when any of the following attributes change in value: cpuType or osInfo.!!

A.4.1.7 Transport Connection

transportConnection MANAGED OBJECT CLASS

DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2 : 1992": top;

CHARACTERIZED BY transportConnectionPkg;

CONDITIONAL PACKAGES

maxRetransmissionsPkg	PRESENT IF !an instance supports it!,
retransmissionTimePkg	PRESENT IF !an instance supports it!,
retransmissionTimerInitialValuePkg	PRESENT IF !an instance supports it!,
pdusRetransmittedCounterPkg	PRESENT IF !an instance supports it!,
octetsRetransmittedPkg	PRESENT IF !an instance supports it!,
pdusRetransmittedThresholdPkg	PRESENT IF !an instance supports it!,
outgoingProtocolErrorPkg	PRESENT IF !an instance supports it!,
checksumPDUsDiscardedPkg	PRESENT IF !an instance supports it!;

REGISTERED AS {x-objectClass 7};

transportConnectionPkg PACKAGE

BEHAVIOUR transportConnectionPkgDefinition,
transportConnectionPkgBehaviour;

ATTRIBUTES

transportConnectionId PERMITTED VALUES SYNTAX-1.GraphicString64 GET,
localTransportConnectionEndpoint GET,


```

remoteTransportConnectionEndpoint GET,
transportConnectionReference PERMITTED VALUES SYNTAX-1.Integer32 GET,
localNetworkAddress GET,
remoteNetworkAddress GET,
inactivityTimeout PERMITTED VALUES SYNTAX-1.Integer32 GET,
inactivityTime PERMITTED VALUES SYNTAX-1.Integer32 GET,
maxPDUSize PERMITTED VALUES SYNTAX-1.Integer32 GET,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":pdusSentCounter
                                PERMITTED VALUES SYNTAX-1.Integer32 GET,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":pdusReceivedCounter
                                PERMITTED VALUES SYNTAX-1.Integer32 GET,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":octetsSentCounter
                                PERMITTED VALUES SYNTAX-1.Integer32 GET,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":octetsReceivedCounter
                                PERMITTED VALUES SYNTAX-1.Integer32 GET,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":incomingProtocolErrorCounter
                                PERMITTED VALUES SYNTAX-1.Integer32 GET;

```

NOTIFICATIONS

```

"Rec. X.721 | ISO/IEC 10165-2 : 1992":objectCreation,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":objectDeletion transportDisconnectCause,
"Rec. X.721 | ISO/IEC 10165-2 : 1992":attributeValueChange;;

```

transportConnectionPkgDefinition BEHAVIOUR

DEFINED AS

!The transportConnection managed object class represents an active transport connection (e.g., an OSI transport connection or a TCP connection). A transport connection is established and used by two peer connection oriented transport protocol layer entities for the purpose of transferring data. A connection oriented transport protocol layer entity may support multiple transport connections.

This is a generally applicable managed object class, in that it does not represent any specific connection-oriented transport protocol; rather it contains characteristics common across various different connection-oriented transport layer protocols. This managed object class is not intended to override any transport layer managed object classes defined in ISO. It provides a high level view of a connection-oriented transport layer protocol and complements the protocol-specific views being defined in the standards.!

transportConnectionPkgBehaviour BEHAVIOUR

DEFINED AS

!An instance of the Transport Connection managed object class is created automatically in response to normal operation of the network. A prerequisite to the creation of a transport connection is the existence of a transport entity (e.g. an instance of the Connection Oriented Transport Protocol Layer Entity) on the open system. When a new Transport Connection instance is created, the "OP1 Library Vol. 2 : 1992":transportConnectionIVMO instance with the same superior may be used to provide initial attribute values for the new instance. Alternatively, the Maximum PDU Size attribute takes on the value of the Maximum PDU Size attribute specified in the superior Transport Protocol Layer Entity managed object instance. Subsequently the Maximum PDU Size attribute may take on another value which applies specifically to the connection represented by the instantiation of the transport connection. This change may occur as the result of peer protocol negotiation.

The Additional Information parameter of the objectDeletion notification may optionally contain a management extension (as defined in DMI) whose identifier is that of the "cause" attribute, whose significance is FALSE, and whose information is "cause" as defined in the associated PARAMETER template.

Conditions under which an attributeValueChange notification is emitted are stated in the behaviour of the appropriate package or attribute. In the absence of such a statement, in the behaviour, the attribute does not cause an attributeValueChange to be emitted.

The attributeValueChange notification is emitted when any of the following attributes change in value: inactivityTimeout, maxPDUSize, and all counter attributes (only when they wrap). All attributeValueChange notifications shall include the Attribute Identifier List parameter. All attributeValueChange notifications which report counter attribute wraps shall contain the maximum counter attribute value in the Old Attribute Value parameter.

Transport Connection will delete itself when the value of the inactivityTime attribute equals that of the inactivityTimeout attribute.!

This is a generally applicable managed object class, in that it does not represent any specific connection-oriented transport protocol. ISO/IEC 10733 [TLM] defines specific objects for managing OSI transport protocol layer entities.

A.4.2 Conditional Packages

A.4.2.1 Addressing Package

addressingPkg PACKAGE

BEHAVIOUR addressingPkgDefinition,
 addressingPkgBehaviour;

ATTRIBUTES addressingSize PERMITTED VALUES SYNTAX-1.AddressingSizeRange GET,
 endianness GET;

REGISTERED AS {x-package 1};

addressingPkgDefinition BEHAVIOUR

DEFINED AS

!This package defines the addressing size and endianness which are characteristic of the underlying resource.!

addressingPkgBehaviour BEHAVIOUR

DEFINED AS

!If the AttributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the addressingSize or endianness attributes change value.!

A.4.2.2 Checksum PDUs Discarded Package

checksumPDUsDiscardedPkg PACKAGE

BEHAVIOUR checksumPDUsDiscardedPkgDefinition,
 checksumPDUsDiscardedPkgBehaviour;

ATTRIBUTES checksumPDUsDiscardedCounter PERMITTED VALUES SYNTAX-1.Integer32 GET;

REGISTERED AS {x-package 2};

checksumPDUsDiscardedPkgDefinition BEHAVIOUR

DEFINED AS

!This package reflects the capability of the underlying resource to count the number of well-formed PDUs rejected by the peer entity due to a checksum error.!

checksumPDUsDiscardedPkgBehaviour BEHAVIOUR

DEFINED AS

!!If the attributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the checksumPDUsDiscarded attribute wraps.!

A.4.2.3 Contact List Package

contactListPkg PACKAGE

BEHAVIOUR contactListPkgDefinition,
 contactListPkgBehaviour;

ATTRIBUTES contactList PERMITTED VALUES SYNTAX-1.AnyNamesRange GET-REPLACE ADD-REMOVE;

REGISTERED AS {x-package 3};

contactListPkgDefinition BEHAVIOUR

DEFINED AS

!The Contact List Attribute identifies who (person or organization) should be contacted about the resource.!

contactListPkgBehaviour BEHAVIOUR

DEFINED AS

!!If the AttributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the contactList attribute changes value.!

A.4.2.4 Contact Name Package

contactNamePkg PACKAGE

BEHAVIOUR contactNamePkgDefinition,
 contactNamePkgBehaviour;

ATTRIBUTES contactName PERMITTED VALUES SYNTAX-1.AnyNameRange GET-REPLACE;

REGISTERED AS {x-package 4};

contactNamePkgDefinition BEHAVIOUR

DEFINED AS

!The Contact Name Attribute identifies who (person or organization) should be contacted about the resource.!

contactNamePkgBehaviour BEHAVIOUR

DEFINED AS

!!If the AttributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the contactName attribute changes value.!

A.4.2.5 CPU Utilization Package

cpuUtilizationPkg PACKAGE

BEHAVIOUR cpuUtilizationPkgBehaviour;

ATTRIBUTES cpuUtilization PERMITTED VALUES SYNTAX-1.PercentageRange
GET; -- changed from GET-REPLACE (Forum)

REGISTERED AS {x-package 5};

cpuUtilizationPkgBehaviour BEHAVIOUR

DEFINED AS

!Even if the AttributeValueChange notification is defined for the managed object class using this package, this notification is NOT emitted when the cpuUtilization attribute changes value.!

A.4.2.6 Customer List Package

customerListPkg PACKAGE

BEHAVIOUR customerListPkgDefinition,
customerListPkgBehaviour;

ATTRIBUTES customerList PERMITTED VALUES SYNTAX-1.AnyNamesRange GET-REPLACE ADD-REMOVE;

REGISTERED AS {x-package 6};

customerListPkgDefinition BEHAVIOUR

DEFINED AS

!The Customer List attribute identifies any customers that are users of the resource.!

customerListPkgBehaviour BEHAVIOUR

DEFINED AS

!If the AttributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the customerList attribute changes value.!

A.4.2.7 Customer Name Package

customerNamePkg PACKAGE

BEHAVIOUR customerNamePkgDefinition,
customerNamePkgBehaviour;

ATTRIBUTES customerName PERMITTED VALUES SYNTAX-1.AnyNameRange GET-REPLACE;

REGISTERED AS {x-package 7};

customerNamePkgDefinition BEHAVIOUR

DEFINED AS

!The Customer Name attribute identifies any customer that is a user of the resource.!

customerNamePkgBehaviour BEHAVIOUR

DEFINED AS

!If the AttributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the customerName attribute changes value.!

A.4.2.8 Function List Package

functionListPkg PACKAGE

BEHAVIOUR functionListPkgDefinition,
functionListPkgBehaviour;

ATTRIBUTES functionList PERMITTED VALUES SYNTAX-1.AnyNamesRange GET-REPLACE ADD-REMOVE;

REGISTERED AS {x-package 8};

functionListPkgDefinition BEHAVIOUR

DEFINED AS

!The functionList attribute identifies those functions provided by this resource.!

functionListPkgBehaviour BEHAVIOUR

DEFINED AS

!!If the AttributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the functionList attribute changes value.!

A.4.2.9 Function Name Package

functionNamePkg PACKAGE

BEHAVIOUR functionNamePkgDefinition,
functionNamePkgBehaviour;

ATTRIBUTES functionName PERMITTED VALUES SYNTAX-1.AnyNameRange GET-REPLACE;

REGISTERED AS {x-package 9};

functionNamePkgDefinition BEHAVIOUR

DEFINED AS

!The functionName attribute identifies the function provided by this resource.!

functionNamePkgBehaviour BEHAVIOUR

DEFINED AS

!!If the AttributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the functionName attribute changes value.!

A.4.2.10 Incoming Protocol Error Package

incomingProtocolErrorPkg PACKAGE

BEHAVIOUR incomingProtocolErrorPkgDefinition,
incomingProtocolErrorPkgBehaviour;

ATTRIBUTES

"Rec. X.721 | ISO/IEC 10165-2 : 1992":incomingProtocolErrorCounter
PERMITTED VALUES SYNTAX-1.Integer32 GET;

REGISTERED AS {x-package 10};

incomingProtocolErrorPkgDefinition BEHAVIOUR

DEFINED AS

!This package reflects the capability of the underlying resource to count the number of incoming protocol errors detected.!

incomingProtocolErrorPkgBehaviour BEHAVIOUR

DEFINED AS

!!If the attributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the incomingProtocolErrorCounter attribute wraps.!

A.4.2.11 Location Pointer Package

```
locationPointerPkg    PACKAGE
    BEHAVIOUR    locationPointerPkgDefinition,
                locationPointerPkgBehaviour;

    ATTRIBUTES
        locationPointer GET-REPLACE;
REGISTERED AS        {x-package 11};

locationPointerPkgDefinition BEHAVIOUR

DEFINED AS
    !This package provides managed object instance information for a location (e.g., Hilo Hawaii USA).!;

locationPointerPkgBehaviour BEHAVIOUR

DEFINED AS
    !If the attributeValueChange notification is defined for the managed object class using this
    package, this notification is emitted when the Location Pointer attribute changes value.!
```

A.4.2.12 Manufacturer List Package

```
manufacturerListPkg    PACKAGE
    BEHAVIOUR    manufacturerListPkgDefinition,
                manufacturerListPkgBehaviour;

    ATTRIBUTES
        manufacturerList PERMITTED VALUES SYNTAX-1.AnyNamesRange GET-REPLACE ADD-REMOVE;
REGISTERED AS        {x-package 12};

manufacturerListPkgDefinition BEHAVIOUR

DEFINED AS
    !This package indicates information about the manufacturer(s) that manufactured the underlying
    resource!;

manufacturerListPkgBehaviour BEHAVIOUR

DEFINED AS
    !If the attributeValueChange notification is defined for the managed object class using this
    package, this notification is emitted when the ManufacturerList attribute changes value.!
```

A.4.2.13 Manufacturer Name Package

```
manufacturerNamePkg    PACKAGE
    BEHAVIOUR    manufacturerNamePkgDefinition,
                manufacturerNamePkgBehaviour;

    ATTRIBUTES
        manufacturerName PERMITTED VALUES SYNTAX-1.AnyNameRange GET-REPLACE;
REGISTERED AS        {x-package 13};
```

manufacturerNamePkgDefinition BEHAVIOUR

DEFINED AS
!This package indicates information about the manufacturer that manufactured the underlying resource!;

manufacturerNamePkgBehaviour BEHAVIOUR

DEFINED AS
!If the attributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the ManufacturerName attribute changes value.!

A.4.2.14 Max PDU Size IV Package

maxPDUSizeIVPkg PACKAGE
BEHAVIOUR maxPDUSizeIVPkgDefinition,
maxPDUSizeIVPkgBehaviour;

ATTRIBUTES
maxPDUSize PERMITTED VALUES SYNTAX-1.Integer32 GET-REPLACE;
REGISTERED AS {x-package 14};

maxPDUSizeIVPkgDefinition BEHAVIOUR

DEFINED AS
!This package provides the initial value for the maximum length of a PDU that can be supported by the local layer entity.!

maxPDUSizeIVPkgBehaviour BEHAVIOUR

DEFINED AS
!The Maximum TPDU Size attribute provides the initial value to be used by newly-instantiated subordinate Transport Connection managed object instances for the maximum TPDU size to be supported on that connection.!

A.4.2.15 Max Retransmissions Package

maxRetransmissionsPkg PACKAGE
BEHAVIOUR maxRetransmissionsPkgDefinition,
maxRetransmissionsPkgBehaviour;

ATTRIBUTES
maxRetransmissions PERMITTED VALUES SYNTAX-1.Integer32 GET;
REGISTERED AS {x-package 15};

maxRetransmissionsPkgDefinition BEHAVIOUR

DEFINED AS
!This package reflects the capability of the underlying transport protocol resource to count the maximum number of times a TPDU is to be retransmitted before the transport connection is aborted.!

maxRetransmissionsPkgBehaviour BEHAVIOUR

DEFINED AS

!When a new Transport Connection instance is created containing this package, any "OP1 Library Vol. 2 : 1992":transportConnectionRetransmissionIVMO instance with the same superior may be used to provide initial attribute values for the new instance.!

A.4.2.16 Memory Size Package

memorySizePkg PACKAGE

 BEHAVIOUR memorySizePkgDefinition,
 memorySizePkgBehaviour;

 ATTRIBUTES memorySize PERMITTED VALUES SYNTAX-1.MemorySizeRange GET;

REGISTERED AS {x-package 16};

memorySizePkgDefinition BEHAVIOUR

DEFINED AS

!The memorySize attribute indicates, in kilobytes, the amount of memory available to a Processing Entity (irrespective of its current usage).!

memorySizePkgBehaviour BEHAVIOUR

DEFINED AS

!If the AttributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the memorySize attribute changes value.!

A.4.2.17 Memory Utilization Package

memoryUtilizationPkg PACKAGE

 BEHAVIOUR memoryUtilizationPkgBehaviour;

 ATTRIBUTES memoryUtilization PERMITTED VALUES SYNTAX-1.PercentageRange
 GET; -- added in response to Bull comment

REGISTERED AS {x-package 17};

memoryUtilizationPkgBehaviour BEHAVIOUR

DEFINED AS

!Even if the AttributeValueChange notification is defined for the managed object class using this package, this notification is NOT emitted when the memoryUtilization attribute changes value.!

A.4.2.18 Octets Retransmitted Package

octetsRetransmittedPkg PACKAGE

 BEHAVIOUR octetsRetransmittedPkgDefinition,
 octetsRetransmittedPkgBehaviour;

ATTRIBUTES

 "Rec. X.721 | ISO/IEC 10165-2 : 1992":octetsRetransmittedErrorCounter
 PERMITTED VALUES SYNTAX-1.Integer32 GET;

REGISTERED AS {x-package 18};

octetsRetransmittedPkgDefinition BEHAVIOUR

DEFINED AS
!This package reflects the capability of the underlying transport protocol resource to count the number of octets retransmitted.!

octetsRetransmittedPkgBehaviour BEHAVIOUR

DEFINED AS
!If the attributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the octetsRetransmitted attribute wraps.!

A.4.2.19 OMNIPoint Network List Package

opNetworkListPkg PACKAGE

BEHAVIOUR opNetworkListPkgDefinition,
opNetworkListPkgBehaviour;

ATTRIBUTES opNetworkList PERMITTED VALUES SYNTAX-1.AnyNamesRange GET-REPLACE ADD-REMOVE;

REGISTERED AS {x-package 19};

opNetworkListPkgDefinition BEHAVIOUR

DEFINED AS
!The opNetworkList attribute indicates what networks use or are dependent on the resource.!

opNetworkListPkgBehaviour BEHAVIOUR

DEFINED AS
!If the AttributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the opNetworkList attribute changes value.!

A.4.2.20 OMNIPoint Network Name Package

opNetworkNamePkg PACKAGE

BEHAVIOUR opNetworkNamePkgDefinition,
opNetworkNamePkgBehaviour;

ATTRIBUTES opNetworkName PERMITTED VALUES SYNTAX-1.AnyNameRange GET-REPLACE;

REGISTERED AS {x-package 20};

opNetworkNamePkgDefinition BEHAVIOUR

DEFINED AS
!The opNetworkName attribute indicates what network uses or is dependent on the resource.!

opNetworkNamePkgBehaviour BEHAVIOUR

DEFINED AS
!If the AttributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the opNetworkName attribute changes value.!

A.4.2.21 OMNIPoint Version Package

opVersionPkg PACKAGE -- refinement of Rec. M.3100 versionPackage

BEHAVIOUR opVersionPkgDefinition,
opVersionPkgBehaviour;

ATTRIBUTES

"Rec. M.3100 : 1992":version

PERMITTED VALUES SYNTAX-1.GraphicString16 GET-REPLACE;

REGISTERED AS {x-package 21};

opVersionPkgDefinition BEHAVIOUR

DEFINED AS

!This package reflects the release version of the underlying resource as an attribute, as defined by
"Rec. M.3100 : 1992".!;

opVersionPkgBehaviour BEHAVIOUR

DEFINED AS

!If the attributeValueChange notification is defined for the managed object class using this
package, this notification is emitted when the Version attribute changes value.!

A.4.2.22 Outgoing Protocol Error Package

outgoingProtocolErrorPkg PACKAGE

BEHAVIOUR outgoingProtocolErrorPkgDefinition,
outgoingProtocolErrorPkgBehaviour;

ATTRIBUTES

"Rec. X.721 | .ISO/IEC 10165-2 : 1992":outgoingProtocolErrorCounter

PERMITTED VALUES SYNTAX-1.Integer32 GET;

REGISTERED AS {x-package 22};

outgoingProtocolErrorPkgDefinition BEHAVIOUR

DEFINED AS

!This package reflects the capability of the underlying resource to count the number of outgoing
protocol errors detected. Note that not all resources have this capability.!

outgoingProtocolErrorPkgBehaviour BEHAVIOUR

DEFINED AS

!If the attributeValueChange notification is defined for the managed object class using this
package, this notification is emitted when the outgoingProtocolErrorCounter attribute wraps.!

A.4.2.23 PDUs Retransmitted Counter Package

pdusRetransmittedCounterPkg PACKAGE

BEHAVIOUR pdusRetransmittedCounterPkgDefinition,
pdusRetransmittedCounterPkgBehaviour;

ATTRIBUTES

"Rec. X.721 | ISO/IEC 10165-2 : 1992":pdusRetransmittedErrorCounter
 PERMITTED VALUES SYNTAX-1.Integer32 GET;

REGISTERED AS {x-package 23};

pdusRetransmittedCounterPkgDefinition BEHAVIOUR

DEFINED AS

!This package reflects the capability of the underlying transport protocol resource to count the number of PDUs retransmitted.!

pdusRetransmittedCounterPkgBehaviour BEHAVIOUR

DEFINED AS

!If the attributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the PDUsRetransmittedCounter attribute wraps.!

A.4.2.24 PDUs Retransmitted Threshold Package

pdusRetransmittedThresholdPkg PACKAGE

BEHAVIOUR pdusRetransmittedThresholdPkgDefinition,
 pdusRetransmittedThresholdPkgBehaviour;

ATTRIBUTES

"Rec. X.721 | ISO/IEC 10165-2 : 1992":pdusRetransmittedErrorThreshold GET-REPLACE;

NOTIFICATIONS

"Rec. X.721 | ISO/IEC 10165-2 : 1992":communicationsAlarm;

REGISTERED AS {x-package 24};

pdusRetransmittedThresholdPkgDefinition BEHAVIOUR

DEFINED AS

!This package reflects the capability of the underlying transport protocol resource to threshold the number of PDUs retransmitted.!

pdusRetransmittedThresholdPkgBehaviour BEHAVIOUR

DEFINED AS

!When a new Transport Connection instance is created containing this package, any "OP1 Library Vol. 2 : 1992":transportConnectionRetransmissionIVMO instance with the same superior may be used to provide initial attribute values for the new instance.

If the attributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the pdusRetransmittedThreshold attribute changes in value.!

A.4.2.25 Peripheral List Package

peripheralListPkg PACKAGE

BEHAVIOUR peripheralListPkgDefinition,
 peripheralListPkgBehaviour;

ATTRIBUTES

```
peripheralList PERMITTED VALUES SYNTAX-1.AnyNamesRange GET-REPLACE ADD-REMOVE;
REGISTERED AS      {x-package 25};

peripheralListPkgDefinition BEHAVIOUR

DEFINED AS
    !The Peripheral List attribute identifies auxiliary devices that are used by the resource (e.g.,
    disk drives, tape drives, printers).!;

peripheralListPkgBehaviour BEHAVIOUR

DEFINED AS
    !If the attributeValueChange notification is defined for the managed object class using this
    package, this notification is emitted when the Peripheral List attribute changes value.!
```

A.4.2.26 Peripheral Name Package

```
peripheralNamePkg PACKAGE

    BEHAVIOUR    peripheralNamePkgDefinition,
                  peripheralNamePkgBehaviour;

    ATTRIBUTES
        peripheralName PERMITTED VALUES SYNTAX-1.AnyNameRange GET-REPLACE;

REGISTERED AS      {x-package 26};

peripheralNamePkgDefinition BEHAVIOUR

DEFINED AS
    !The Peripheral Name attribute identifies an auxiliary device that is used by the resource (e.g.,
    disk drive, tape drive, printer).!;

peripheralNamePkgBehaviour BEHAVIOUR

DEFINED AS
    !If the attributeValueChange notification is defined for the managed object class using this
    package, this notification is emitted when the Peripheral Name attribute changes value.!
```

A.4.2.27 Processing Entity List Package

```
processingEntityListPkg PACKAGE

    BEHAVIOUR    processingEntityListPkgDefinition,
                  processingEntityListPkgBehaviour;

    ATTRIBUTES
        processingEntityList PERMITTED VALUES SYNTAX-1.AnyNamesRange GET-REPLACE ADD-REMOVE;

REGISTERED AS      {x-package 27};

processingEntityListPkgDefinition BEHAVIOUR

DEFINED AS
```

!The Processing Entity List attribute identifies the processing entities which may be used by the containing object instance but which are not contained in it (i.e., processing entities which are shared among systems).!;

processingEntityListPkgBehaviour BEHAVIOUR

DEFINED AS

!!If the attributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the Processing Entity List attribute changes value.!!;

A.4.2.28 Processing Entity Name Package

processingEntityNamePkg PACKAGE

BEHAVIOUR processingEntityNamePkgDefinition,
processingEntityNamePkgBehaviour;

ATTRIBUTES

processingEntityName PERMITTED VALUES SYNTAX-1.AnyNameRange GET-REPLACE;

REGISTERED AS {x-package 28};

processingEntityNamePkgDefinition BEHAVIOUR

DEFINED AS

!The Processing Entity Name attribute identifies the processing entity which may be used by the containing object instance but which is not contained in it (i.e., processing entities which are shared among systems).!;

processingEntityNamePkgBehaviour BEHAVIOUR

DEFINED AS

!!If the attributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the Processing Entity Name attribute changes value.!!;

A.4.2.29 Product Label Package

productLabelPkg PACKAGE

BEHAVIOUR productLabelPkgDefinition,
productLabelPkgBehaviour;

ATTRIBUTES

productLabel PERMITTED VALUES SYNTAX-1.GraphicString32 GET-REPLACE;

REGISTERED AS {x-package 29};

productLabelPkgDefinition BEHAVIOUR

DEFINED AS

!This package allows the product number or identifying string (e.g., model number) of the underlying resource to be reflected as an attribute.!!;

productLabelPkgBehaviour BEHAVIOUR

DEFINED AS

!If the attributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the Product Label attribute changes value.!

A.4.2.30 Retransmission Time Package

retransmissionTimePkg PACKAGE

BEHAVIOUR retransmissionTimePkgDefinition,
retransmissionTimePkgBehaviour;

ATTRIBUTES

retransmissionTime PERMITTED VALUES SYNTAX-1.Integer32 GET;

REGISTERED AS {x-package 30};

retransmissionTimePkgDefinition BEHAVIOUR

DEFINED AS

!This package reflects the capability of the underlying transport protocol resource to present its current retransmission timer value as an attribute.!

retransmissionTimePkgBehaviour BEHAVIOUR

DEFINED AS

!When a new Transport Connection instance is created containing this package, the initial value of this attribute may be provided by the retransmissionTimerInitialValue attribute (if present in the new managed object instance).!

A.4.2.31 Retransmission Timer Initial Value Package

retransmissionTimerInitialValuePkg PACKAGE

BEHAVIOUR retransmissionTimerInitialValuePkgDefinition,
retransmissionTimerInitialValuePkgBehaviour;

ATTRIBUTES

retransmissionTimerInitialValue PERMITTED VALUES SYNTAX-1.Integer32 GET;

REGISTERED AS {x-package 31};

retransmissionTimerInitialValuePkgDefinition BEHAVIOUR

DEFINED AS

!This package reflects the capability of the underlying transport protocol resource to present its initial retransmission timer value as an attribute.!

retransmissionTimerInitialValuePkgBehaviour BEHAVIOUR

DEFINED AS

!When a new Transport Connection instance is created containing this package, any "OP1 Library Vol. 2 : 1992":transportConnectionRetransmissionIVMO instance with the same superior may be used to provide initial attribute values for the new instance.!

A.4.2.32 Serial Number Package

serialNumberPkg PACKAGE

BEHAVIOUR serialNumberPkgDefinition,
serialNumberPkgBehaviour;

ATTRIBUTES
serialNumber PERMITTED VALUES SYNTAX-1.GraphicString32 GET-REPLACE;

REGISTERED AS {x-package 32};

serialNumberPkgDefinition BEHAVIOUR

DEFINED AS
!This package allows the serial number of the underlying resource to be reflected as an attribute.!

serialNumberPkgBehaviour BEHAVIOUR

DEFINED AS
!If the attributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the Serial Number attribute changes value.!

A.4.2.33 Service List Package

serviceListPkg PACKAGE

BEHAVIOUR serviceListPkgDefinition,
serviceListPkgBehaviour;

ATTRIBUTES serviceList PERMITTED VALUES SYNTAX-1.AnyNamesRange GET-REPLACE ADD-REMOVE;

REGISTERED AS {x-package 33};

serviceListPkgDefinition BEHAVIOUR

DEFINED AS
!Service List attribute identifies any services that are supported by the resource.!

serviceListPkgBehaviour BEHAVIOUR

DEFINED AS
!If the AttributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the serviceList attribute changes value.!

A.4.2.34 Service Name Package

serviceNamePkg PACKAGE

BEHAVIOUR serviceNamePkgDefinition,
serviceNamePkgBehaviour;

ATTRIBUTES serviceName PERMITTED VALUES SYNTAX-1.AnyNameRange GET-REPLACE;

REGISTERED AS {x-package 34};

serviceNamePkgDefinition BEHAVIOUR

DEFINED AS

!Service Name attribute identifies any service that is supported by the resource.!

serviceNamePkgBehaviour BEHAVIOUR

DEFINED AS

!If the AttributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the serviceName attribute changes value.!

A.4.2.35 Software List Package

softwareListPkg PACKAGE

BEHAVIOUR softwareListPkgDefinition,
softwareListPkgBehaviour;

ATTRIBUTES softwareList PERMITTED VALUES SYNTAX-1.AnyNamesRange GET-REPLACE ADD-REMOVE;

REGISTERED AS {x-package 35};

softwareListPkgDefinition BEHAVIOUR

DEFINED AS

!The Software List attribute identifies those software components that run on or are considered part of the resource.!

softwareListPkgBehaviour BEHAVIOUR

DEFINED AS

!If the AttributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the softwareList attribute changes value.!

A.4.2.36 Software Name Package

softwareNamePkg PACKAGE

BEHAVIOUR softwareNamePkgDefinition,
softwareNamePkgBehaviour;

ATTRIBUTES softwareName PERMITTED VALUES SYNTAX-1.AnyNameRange GET-REPLACE;

REGISTERED AS {x-package 36};

softwareNamePkgDefinition BEHAVIOUR

DEFINED AS

!The Software Name attribute identifies the software component that runs on or are considered part of the resource.!

softwareNamePkgBehaviour BEHAVIOUR

DEFINED AS

!If the AttributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the softwareName attribute changes value.!

A.4.2.37 System Time Package

systemTimePkg PACKAGE

BEHAVIOUR systemTimePkgDefinition,

systemTimePkgBehaviour;

ATTRIBUTES

systemTime PERMITTED VALUES SYNTAX-1.Integer32 GET;

REGISTERED AS {x-package 37};

systemTimePkgDefinition BEHAVIOUR

DEFINED AS

!This package records the current time clocked by the resource.!

systemTimePkgBehaviour BEHAVIOUR

DEFINED AS

!The attribute contained in this package is never the subject of an attribute value change notification. Even if the AttributeValueChange notification is defined for the managed object class using this package, this notification is NOT emitted when the systemTime attribute changes value.!

A.4.2.38 Type Text Package

typeTextPkg PACKAGE

BEHAVIOUR typeTextPkgDefinition,
typeTextPkgBehaviour;

ATTRIBUTES

typeText PERMITTED VALUES SYNTAX-1.GraphicString32 GET-REPLACE;

REGISTERED AS {x-package 38};

typeTextPkgDefinition BEHAVIOUR

DEFINED AS

!This package serves to supplement and refine individual managed object class attributes!

typeTextPkgBehaviour BEHAVIOUR

DEFINED AS

!If the attributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the Type Text attribute changes value.!

A.4.2.39 Up Time Package

upTimePkg PACKAGE

BEHAVIOUR upTimePkgDefinition,
upTimePkgBehaviour;

ATTRIBUTES

upTime PERMITTED VALUES SYNTAX-1.Integer32 GET;

REGISTERED AS {x-package 39};

upTimePkgDefinition BEHAVIOUR

DEFINED AS

!This package records the elapsed time during which the underlying resource has been enabled.!

upTimePkgBehaviour BEHAVIOUR

DEFINED AS

!The attribute contained in this package is never the subject of an attribute value change notification. Even if the AttributeValueChange notification is defined for the managed object class using this package, this notification is NOT emitted when the upTime attribute changes value.!

A.4.2.40 Usage State Package

usageStatePkg PACKAGE

BEHAVIOUR usageStatePkgDefinition,
usageStatePkgBehaviour;

ATTRIBUTES

"Rec. X.721 | ISO/IEC 10165-2 : 1992":usageState GET;

ATTRIBUTE GROUPS

"Rec. X.721 | ISO/IEC 10165-2 : 1992":state

"Rec. X.721 | ISO/IEC 10165-2 : 1992":usageState;

REGISTERED AS {x-package 40};

usageStatePkgDefinition BEHAVIOUR

DEFINED AS

!This package specifies the Usage State of the underlying resource, to be included in resources which are able to detect whether or not they are currently in use.!

usageStatePkgBehaviour BEHAVIOUR

DEFINED AS

!If the stateChange notification is defined for the managed object class using this package, this notification is emitted when the usageState attribute changes value.!

A.4.2.41 Vendor List Package

vendorListPkg PACKAGE

BEHAVIOUR vendorListPkgDefinition,
vendorListPkgBehaviour;

ATTRIBUTES vendorList PERMITTED VALUES SYNTAX-1.AnyNamesRange GET-REPLACE ADD-REMOVE;

REGISTERED AS {x-package 41};

vendorListPkgDefinition BEHAVIOUR

DEFINED AS

!The Vendor List attribute identifies the organization(s) from which the resource was obtained (e.g., purchased, leased, etc.);

vendorListPkgBehaviour BEHAVIOUR

DEFINED AS

!!If the AttributeValueChange notification is defined for the managed object class using this package, this notification is emitted when the vendorList attribute changes value.!

A.4.3 Name Bindings

A.4.3.1 Computer System Name Bindings

```
computerSystem-system      NAME BINDING
SUBORDINATE OBJECT CLASS  computerSystem AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS    "Rec. X.721 | ISO/IEC 10165-2 : 1992":system;
WITH ATTRIBUTE            computerSystemId;
CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS {x-nameBinding 1};
```

```
computerSystem-opNetwork   NAME BINDING
SUBORDINATE OBJECT CLASS  computerSystem AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS     opNetwork AND SUBCLASSES;
WITH ATTRIBUTE            computerSystemId;
CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS {x-nameBinding 2};
```

```
computerSystem-computerSystem NAME BINDING
SUBORDINATE OBJECT CLASS  computerSystem AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS     computerSystem AND SUBCLASSES;
WITH ATTRIBUTE            computerSystemId;
CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS {x-nameBinding 3};
```

A.4.3.2 CO Transport Protocol Layer Entity Name Bindings

```
coTransportProtocolLayerEntity-computerSystem NAME BINDING
SUBORDINATE OBJECT CLASS  coTransportProtocolLayerEntity AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS     computerSystem AND SUBCLASSES;
WITH ATTRIBUTE            coTransportProtocolLayerEntityId;
REGISTERED AS {x-nameBinding 4};
```

```
coTransportProtocolLayerEntity-system NAME BINDING
SUBORDINATE OBJECT CLASS  coTransportProtocolLayerEntity AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS     "Rec. X.721 | ISO/IEC 10165-2 : 1992": system AND SUBCLASSES;
WITH ATTRIBUTE            coTransportProtocolLayerEntityId;
```



```
REGISTERED AS {x-nameBinding 5};

coTransportProtocolLayerEntity-opEquipment NAME BINDING
  SUBORDINATE OBJECT CLASS coTransportProtocolLayerEntity AND SUBCLASSES;
  NAMED BY
    SUPERIOR OBJECT CLASS opEquipment AND SUBCLASSES;
  WITH ATTRIBUTE coTransportProtocolLayerEntityId;
REGISTERED AS {x-nameBinding 6};
```

A.4.3.3 CL Network Protocol Layer Entity Name Bindings

```
clNetworkProtocolLayerEntity-computerSystem NAME BINDING
  SUBORDINATE OBJECT CLASS clNetworkProtocolLayerEntity AND SUBCLASSES;
  NAMED BY
    SUPERIOR OBJECT CLASS computerSystem AND SUBCLASSES;
  WITH ATTRIBUTE clNetworkProtocolLayerEntityId;
REGISTERED AS {x-nameBinding 7};
```

```
clNetworkProtocolLayerEntity-system NAME BINDING
  SUBORDINATE OBJECT CLASS clNetworkProtocolLayerEntity AND SUBCLASSES;
  NAMED BY
    SUPERIOR OBJECT CLASS
      "Rec. X.721 | ISO/IEC 10165-2 : 1992": system AND SUBCLASSES;
  WITH ATTRIBUTE clNetworkProtocolLayerEntityId;
REGISTERED AS {x-nameBinding 8};
```

```
clNetworkProtocolLayerEntity-opEquipment NAME BINDING
  SUBORDINATE OBJECT CLASS clNetworkProtocolLayerEntity AND SUBCLASSES;
  NAMED BY
    SUPERIOR OBJECT CLASS opEquipment AND SUBCLASSES;
  WITH ATTRIBUTE clNetworkProtocolLayerEntityId;
REGISTERED AS {x-nameBinding 9};
```

A.4.3.4 OMNIPoint Equipment Name Bindings

```
opEquipment-computerSystem NAME BINDING
  SUBORDINATE OBJECT CLASS opEquipment AND SUBCLASSES;
  NAMED BY
    SUPERIOR OBJECT CLASS computerSystem AND SUBCLASSES;
  WITH ATTRIBUTE "Rec. M.3100 : 1992":equipmentId;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
```

```
REGISTERED AS {x-nameBinding 10};
```

```
opEquipment-system NAME BINDING
  SUBORDINATE OBJECT CLASS opEquipment AND SUBCLASSES;
  NAMED BY
    SUPERIOR OBJECT CLASS "Rec. X.721 | ISO/IEC 10165-2 : 1992":system;
  WITH ATTRIBUTE "Rec. M.3100 : 1992":equipmentId;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
```

```
REGISTERED AS {x-nameBinding 11};
```

```
opEquipment-equipment NAME BINDING
  SUBORDINATE OBJECT CLASS opEquipment AND SUBCLASSES;
  NAMED BY
    SUPERIOR OBJECT CLASS "Rec. M.3100 : 1992":equipment AND SUBCLASSES;
  WITH ATTRIBUTE "Rec. M.3100 : 1992":equipmentId;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
```



```
DELETE ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS {x-nameBinding 12};

opEquipment-opNetwork      NAME BINDING
SUBORDINATE OBJECT CLASS  opEquipment AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS      opNetwork AND SUBCLASSES;
WITH ATTRIBUTE "Rec. M.3100 : 1992":equipmentId;
CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS {x-nameBinding 13};
```

A.4.3.5 OMNIPoint Network Name Bindings

-- The following name bindings are defined, in addition to those
-- inherited from Rec. M.3100 Network (which do not include CREATE/DELETE):

```
network-opNetwork-1      NAME BINDING
SUBORDINATE OBJECT CLASS  opNetwork AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS "Rec. M.3100 : 1992":network AND SUBCLASSES;
WITH ATTRIBUTE "Rec. M.3100 : 1992":networkId;
CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS {x-nameBinding 14};
```

```
network-opNetwork-2      NAME BINDING
SUBORDINATE OBJECT CLASS  opNetwork AND SUBCLASSES;
NAMED BY
SUPERIOR OBJECT CLASS "Rec. M.3100 : 1992":network AND SUBCLASSES;
WITH ATTRIBUTE networkTitle;
CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS {x-nameBinding 15};
```

```
opNetwork-root          NAME BINDING
SUBORDINATE OBJECT CLASS  opNetwork AND SUBCLASSES;
NAMED BY SUPERIOR OBJECT CLASS "Rec. X.660 | ISO/IEC 9834-1 : 1992":root;
WITH ATTRIBUTE networkTitle;
CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE ONLY-IF-NO-CONTAINED-OBJECTS;

REGISTERED AS {x-nameBinding 16};
```

A.4.3.6 Processing Entity Name Bindings

-- processingEntity-opEquipment NAME BINDING
-- processingEntity-computerSystem NAME BINDING
-- both inherited from opEquipment, no additional bindings required.

A.4.3.7 Transport Connection Name Bindings

```
transportConnection-coTransportProtocolLayerEntity NAME BINDING
```

```
SUBORDINATE OBJECT CLASS transportConnection AND SUBCLASSES;  
NAMED BY  
SUPERIOR OBJECT CLASS coTransportProtocolLayerEntity AND SUBCLASSES;  
WITH ATTRIBUTE transportConnectionId;  
BEHAVIOUR transportConnectionNBBehaviour;  
DELETE DELETES-CONTAINED-OBJECTS;  
REGISTERED AS {x-nameBinding 17};
```

transportConnectionNBBehaviour BEHAVIOUR

DEFINED AS

!The expected real effect of the DELETE operation when applied to an instance of the transport connection managed object class is that the underlying transport connection resource is aborted.!!;

A.4.4 Attributes

A.4.4.1 Active Connections

activeConnections ATTRIBUTE

```
WITH ATTRIBUTE SYNTAX SYNTAX-1.IntegerBase;  
MATCHES FOR EQUALITY, ORDERING;  
BEHAVIOUR activeConnectionsBehaviour;
```

REGISTERED AS {x-attribute 1};

activeConnectionsBehaviour BEHAVIOUR

DEFINED AS

!The activeConnections attribute specifies the number of currently active transport connections (i.e., the number of transport connections which are in the open state [as defined for the underlying protocol machine], updated upon each connection establishment and release).!!;

A.4.4.2 Addressing Size

addressingSize ATTRIBUTE

```
WITH ATTRIBUTE SYNTAX SYNTAX-1.AddressingSizeBase;  
MATCHES FOR EQUALITY, ORDERING;  
BEHAVIOUR addressingSizeBehaviour;
```

REGISTERED AS {x-attribute 2};

addressingSizeBehaviour BEHAVIOUR

DEFINED AS

!The Addressing Size attribute indicates the number of bits which represent an address to the Processing Entity's central processing unit (CPU).!!;

A.4.4.3 Checksum PDUs Discarded Counter

checksumPDUsDiscardedCounter ATTRIBUTE

```
DERIVED FROM  
"Rec. X.721 | ISO/IEC 10165-2 : 1992": counter;  
BEHAVIOUR checksumPDUsDiscardedCounterBehaviour;
```

REGISTERED AS {x-attribute 3};

checksumPDUsDiscardedCounterBehaviour BEHAVIOUR

DEFINED AS

!The attribute specifies the number of well-formed PDUs rejected by the peer entity due to a checksum error.!

A.4.4.4 Computer System Id

computerSystemId ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.GraphicStringBase;
MATCHES FOR EQUALITY, SUBSTRINGS;
BEHAVIOUR computerSystemIdBehaviour;

REGISTERED AS {x-attribute 4};

computerSystemIdBehaviour BEHAVIOUR

DEFINED AS

!The computerSystemId attribute is the distinguishing attribute for the computerSystem managed object class.!

A.4.4.5 CL Network Protocol Layer Entity Id

clNetworkProtocolLayerEntityId ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.GraphicStringBase;
MATCHES FOR EQUALITY, SUBSTRINGS;
BEHAVIOUR clNetworkProtocolLayerEntityIdBehaviour;

REGISTERED AS {x-attribute 5};

clNetworkProtocolLayerEntityIdBehaviour BEHAVIOUR

DEFINED AS

!The clNetworkProtocolLayerEntityId attribute is the distinguishing attribute for the clNetworkProtocolLayerEntity managed object class.!

A.4.4.6 CO Transport Protocol Layer Entity Id

coTransportProtocolLayerEntityId ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.GraphicStringBase;
MATCHES FOR EQUALITY, SUBSTRINGS;
BEHAVIOUR coTransportProtocolLayerEntityIdBehaviour;

REGISTERED AS {x-attribute 6};

coTransportProtocolLayerEntityIdBehaviour BEHAVIOUR

DEFINED AS

!The coTransportProtocolLayerEntityId attribute is the distinguishing attribute for the coTransportProtocolLayerEntity managed object class.!

A.4.4.7 Contact List

contactList ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.AnyNamesBase;
MATCHES FOR SET-COMPARISON, SET-INTERSECTION;
BEHAVIOUR contactListBehaviour;

REGISTERED AS {x-attribute 7};

contactListBehaviour BEHAVIOUR

DEFINED AS

!The Contact List attribute provides managed object instance information for one or more contacts. The following object classes (or any of their subclasses or allomorphic classes) are valid as contacts: "OP1 Library Vol. 4":Contact.

The SET-COMPARISON and/or SET-INTERSECTION matching rules may not be supported by some managed object instances which include this attribute.!

A.4.4.8 Contact Name

contactName ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.AnyNameBase;
MATCHES FOR EQUALITY, SUBSTRINGS;
BEHAVIOUR contactNameBehaviour;

REGISTERED AS {x-attribute 8};

contactNameBehaviour BEHAVIOUR

DEFINED AS

!The Contact Name attribute provides information for one person or organization who can be contacted about the resource.!

A.4.4.9 CPU Type

cpuType ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.GraphicStringBase;
MATCHES FOR EQUALITY, SUBSTRINGS;
BEHAVIOUR cpuTypeBehaviour;

REGISTERED AS {x-attribute 9};

cpuTypeBehaviour BEHAVIOUR

DEFINED AS

!The Central Processor Unit (CPU) Type attribute indicates the type of central processor unit found in a Processing Entity.!

A.4.4.10 CPU Utilization

cpuUtilization ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.IntegerBase;
MATCHES FOR EQUALITY, ORDERING;
BEHAVIOUR cpuUtilizationBehaviour;

REGISTERED AS {x-attribute 10};

cpuUtilizationBehaviour BEHAVIOUR

DEFINED AS

!The cpuUtilization attribute specifies, as a percentage, the overall utilization of all central processor units found in a processing entity. The percentage is expressed as an integer with permissible values in the range of 0 to 100.!

A.4.4.11 Customer List

customerList ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.AnyNamesBase;
MATCHES FOR SET-COMPARISON, SET-INTERSECTION;
BEHAVIOUR customerListBehaviour;

REGISTERED AS (x-attribute 11);

customerListBehaviour BEHAVIOUR

DEFINED AS

!The Customer List attribute provides managed object instance information about one or more customers. The following classes (or any of their subclasses or allomorphic classes) are valid as customers: "OP1 Library Vol. 4":Customer.

The SET-COMPARISON and/or SET-INTERSECTION matching rules may not be supported by some managed object instances which include this attribute.!

A.4.4.12 Customer Name

customerName ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.AnyNameBase;
MATCHES FOR EQUALITY, SUBSTRINGS;
BEHAVIOUR customerNameBehaviour;

REGISTERED AS (x-attribute 12);

customerNameBehaviour BEHAVIOUR

DEFINED AS

!The Customer Name attribute provides information about one customer.!

A.4.4.13 Endianess

endianess ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.Endianess;
MATCHES FOR EQUALITY, ORDERING;
BEHAVIOUR endianessBehaviour;

REGISTERED AS (x-attribute 13);

endianessBehaviour BEHAVIOUR

DEFINED AS

!The Endianess attribute indicates the bit order (big endian, little endian) used by the Processing Entity's central processing unit (CPU).!

A.4.4.14 Function List

functionList ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.AnyNamesBase;

MATCHES FOR SET-COMPARISON, SET-INTERSECTION;
BEHAVIOUR functionListBehaviour;

REGISTERED AS {x-attribute 14};

functionListBehaviour BEHAVIOUR

DEFINED AS

!The Function List attribute provides managed object instance information about one or more functions. The following managed object classes (or any of their subclasses or allomorphic classes) are valid as functions: "OP1 Library Vol. 4":Function.

The SET-COMPARISON and/or SET-INTERSECTION matching rules may not be supported by some managed object instances which include this attribute.!

A.4.4.15 Function Name

functionName ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.AnyNameBase;
MATCHES FOR EQUALITY, SUBSTRINGS;
BEHAVIOUR functionNameBehaviour;

REGISTERED AS {x-attribute 15};

functionNameBehaviour BEHAVIOUR

DEFINED AS

!The Function Name attribute provides information about one function.!

A.4.4.16 Inactivity Time

inactivityTime ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.HundredthsOfSec;
MATCHES FOR EQUALITY, ORDERING;
BEHAVIOUR inactivityTimeBehaviour;

REGISTERED AS {x-attribute 16};

inactivityTimeBehaviour BEHAVIOUR

DEFINED AS

!This attribute specifies the amount of time (in 1/100ths of a second) that the transport connection has been inactive.!

A.4.4.17 Inactivity Timeout

inactivityTimeout ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.HundredthsOfSec;
MATCHES FOR EQUALITY, ORDERING;
BEHAVIOUR inactivityTimeoutBehaviour;

REGISTERED AS {x-attribute 17};

inactivityTimeoutBehaviour BEHAVIOUR

DEFINED AS

!This attribute specifies the maximum amount of time (in 1/100ths of a second) that the transport connection can remain enabled when there is no activity (i.e., data flow) on it. A value of 0 for this attribute indicates that an inactivity timeout is not supported on the transport connection.!

A.4.4.18 Local Network Address

localNetworkAddress ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.Address;
MATCHES FOR EQUALITY, SUBSTRINGS;
BEHAVIOUR localNetworkAddressBehaviour;

REGISTERED AS {x-attribute 18};

localNetworkAddressBehaviour BEHAVIOUR

DEFINED AS

!The localNetworkAddress attribute identifies the local network address supported by a network protocol layer entity (e.g., local IP address for TCP or the local NSAP address for OSI).!

A.4.4.19 Local Network Addresses

localNetworkAddresses ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.NetworkAddresses;
MATCHES FOR SET-COMPARISON, SET-INTERSECTION;
BEHAVIOUR localNetworkAddressesBehaviour;

REGISTERED AS {x-attribute 19};

localNetworkAddressesBehaviour BEHAVIOUR

DEFINED AS

!The localNetworkAddresses attribute identifies the local network addresses supported by a network protocol layer entity (e.g., local IP address for TCP or the local NSAP address for OSI).

Set comparison and/or set intersection matching rules may not be supported by some managed object instances which include this attribute.!

A.4.4.20 Local Transport Addresses

localTransportAddresses ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.TransportAddresses;
MATCHES FOR SET-COMPARISON, SET-INTERSECTION;
BEHAVIOUR localTransportAddressesBehaviour;

REGISTERED AS {x-attribute 20};

localTransportAddressesBehaviour BEHAVIOUR

DEFINED AS

!The localTransportAddresses attribute specifies the set of local transport addresses (e.g, local TSAP identifiers) that a connection oriented transport protocol layer entity provides to its users. A transport address consists of a transport connection endpoint and a network address.

Set comparison and/or set intersection matching rules may not be supported by some managed object instances which include this attribute.!

A.4.4.21 Local Transport Connection Endpoint

localTransportConnectionEndpoint **ATTRIBUTE**

WITH ATTRIBUTE SYNTAX SYNTAX-1.Address;
MATCHES FOR EQUALITY, SUBSTRINGS;
BEHAVIOUR localTransportConnectionEndpointBehaviour;

REGISTERED AS {x-attribute 21};

localTransportConnectionEndpointBehaviour **BEHAVIOUR**

DEFINED AS

!This attribute identifies the local transport connection endpoint (e.g., the source port for TCP or the local t-selector for OSI Transport protocol).!

A.4.4.22 Location Pointer

locationPointer **ATTRIBUTE**

WITH ATTRIBUTE SYNTAX SYNTAX-1.ObjectInstance;
MATCHES FOR EQUALITY;
BEHAVIOUR locationPointerBehaviour;

REGISTERED AS {x-attribute 22};

locationPointerBehaviour **BEHAVIOUR**

DEFINED AS

!The Location Pointer attribute provides managed object instance information for a location (e.g., Hilo Hawaii USA). The following managed object classes (or any of their subclasses or allomorphic classes) are valid as locations: "OP1 Library Vol. 4":Location.!

A.4.4.23 Manufacturer List

manufacturerList **ATTRIBUTE**

WITH ATTRIBUTE SYNTAX SYNTAX-1.AnyNamesBase;
MATCHES FOR SUBSTRINGS, SET-COMPARISON, SET-INTERSECTION;
BEHAVIOUR manufacturerListBehaviour;

REGISTERED AS {x-attribute 23};

manufacturerListBehaviour **BEHAVIOUR**

DEFINED AS

!The manufacturerList attribute indicates information about the manufacturer(s) that manufactured the underlying resource. This attribute contains object instance name(s) for "OP1 Library Vol. 4":manufacturer (or any subclass or allomorphic class).

Set comparison and/or set intersection matching rules may not be supported by some managed object instances which include this attribute.!

A.4.4.24 Manufacturer Name

manufacturerName **ATTRIBUTE**

WITH ATTRIBUTE SYNTAX SYNTAX-1.AnyNameBase;
MATCHES FOR EQUALITY, SUBSTRINGS;
BEHAVIOUR manufacturerNameBehaviour;

REGISTERED AS {x-attribute 24};

manufacturerNameBehaviour **BEHAVIOUR**

DEFINED AS

!The **manufacturerName** attribute indicates information about the manufacturer(s) that manufactured the underlying resource. This attribute contains descriptive text.!

A.4.4.25 Max Connections

maxConnections **ATTRIBUTE**

WITH ATTRIBUTE SYNTAX **SYNTAX-1.IntegerBase;**
MATCHES FOR **EQUALITY, ORDERING;**
BEHAVIOUR **maxConnectionsBehaviour;**

REGISTERED AS **{x-attribute 25};**

maxConnectionsBehaviour **BEHAVIOUR**

DEFINED AS

!The **maxConnections** attribute specifies the maximum number of simultaneously active/open transport connections that can be supported by the transport protocol layer entity.!

A.4.4.26 Max PDU Size

maxPDUSize **ATTRIBUTE**

WITH ATTRIBUTE SYNTAX **SYNTAX-1.IntegerBase;**
MATCHES FOR **EQUALITY, ORDERING;**
BEHAVIOUR **maxPDUSizeBehaviour;**

REGISTERED AS **{x-attribute 26};**

maxPDUSizeBehaviour **BEHAVIOUR**

DEFINED AS

!The **maxPDUSize** attribute specifies the maximum length of a PDU that can be supported by the local layer entity.!

A.4.4.27 Max Retransmissions

maxRetransmissions **ATTRIBUTE**

WITH ATTRIBUTE SYNTAX **SYNTAX-1.IntegerBase;**
MATCHES FOR **EQUALITY, ORDERING;**
BEHAVIOUR **maxRetransmissionsBehaviour;**

REGISTERED AS **{x-attribute 27};**

maxRetransmissionsBehaviour **BEHAVIOUR**

DEFINED AS

!This attribute specifies the maximum number of times a TPDU is to be retransmitted before the transport connection is aborted.!

A.4.4.28 Memory Size

memorySize **ATTRIBUTE**

WITH ATTRIBUTE SYNTAX **SYNTAX-1.MemorySizeBase;**
MATCHES FOR **EQUALITY, ORDERING;**
BEHAVIOUR **memorySizeBehaviour;**

REGISTERED AS {x-attribute 28};

memorySizeBehaviour BEHAVIOUR

DEFINED AS

!The Memory Size attribute indicates, in kilobytes, the amount of memory available to a Processing Entity (irrespective of its current usage).!;

A.4.4.29 Memory Utilization

memoryUtilization ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.IntegerBase;

MATCHES FOR EQUALITY, ORDERING;

BEHAVIOUR memoryUtilizationBehaviour;

REGISTERED AS {x-attribute 29};

memoryUtilizationBehaviour BEHAVIOUR

DEFINED AS

!The memoryUtilization attribute specifies, as a percentage, the overall utilization of amount of memory available to a processing entity. The percentage is expressed as an integer with permissible values in the range of 0 to 100.!;

A.4.4.30 Network Entity Type

networkEntityType ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.NetworkEntityType;

MATCHES FOR EQUALITY;

BEHAVIOUR networkEntityTypeBehaviour;

REGISTERED AS {x-attribute 30};

networkEntityTypeBehaviour BEHAVIOUR

DEFINED AS

!The networkEntityType attribute indicates the type of the network protocol layer entity.!;

A.4.4.31 Network Title

networkTitle ATTRIBUTE

DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2 : 1992":systemTitle;

BEHAVIOUR networkTitleBehaviour;

REGISTERED AS {x-attribute 31};

networkTitleBehaviour BEHAVIOUR

DEFINED AS

!The Network Title is one of the distinguishing attribute the network managed object class for use as described in clause 6.3 of [MIM]!;

A.4.4.32 NPDU Time To Live

nPDUTimeToLive ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.IntegerBase;
MATCHES FOR EQUALITY, ORDERING;
BEHAVIOUR nPDUTimeToLiveBehaviour;

REGISTERED AS {x-attribute 32};

nPDUTimeToLiveBehaviour BEHAVIOUR

DEFINED AS

!This attribute specifies the maximum amount of time (in units of 10 ms) that an NPDU can exist in the network. This attribute is used to limit the lifetime of NPDUs during unstable network situations.!

A.4.4.33 OMNIPoint Equipment List

opEquipmentList ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.AnyNamesBase;
MATCHES FOR SET-COMPARISON, SET-INTERSECTION;
BEHAVIOUR opEquipmentListBehaviour;

REGISTERED AS {x-attribute 33};

opEquipmentListBehaviour BEHAVIOUR

DEFINED AS

!The OMNIPoint Equipment List attribute provides managed object instance information about one or more pieces of opEquipment. The following classes (or any of their subclasses or allomorphic classes) are valid as equipment: OMNIPoint Equipment.

The SET-COMPARISON and/or SET-INTERSECTION matching rules may not be supported by some managed object instances which include this attribute.!

A.4.4.34 OMNIPoint Network List

opNetworkList ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.AnyNamesBase;
MATCHES FOR SET-COMPARISON, SET-INTERSECTION;
BEHAVIOUR opNetworkListBehaviour;

REGISTERED AS {x-attribute 34};

opNetworkListBehaviour BEHAVIOUR

DEFINED AS

!The OMNIPoint Network List attribute shall provide managed object instance information about a set of networks. The following object classes (or any of their subclasses or allomorphic classes) are valid as networks: OMNIPoint Network.

The SET-COMPARISON and/or SET-INTERSECTION matching rules may not be supported by some managed object instances which include this attribute.!

A.4.4.35 OMNIPoint Network Name

opNetworkName ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.AnyNameBase;
MATCHES FOR EQUALITY, SUBSTRINGS;
BEHAVIOUR opNetworkNameBehaviour;

REGISTERED AS {x-attribute 35};

opNetworkNameBehaviour BEHAVIOUR

DEFINED AS

!The OMNIPoint Network Name attribute shall provide information about a network.!

A.4.4.36 Operating System Information

osInfo ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.OsInfoBase;
MATCHES FOR EQUALITY, SET-COMPARISON, SET-INTERSECTION;
BEHAVIOUR osInfoBehaviour;

REGISTERED AS {x-attribute 36};

osInfoBehaviour BEHAVIOUR

DEFINED AS

!The Operating System Information attribute specifies the names and releases of the supported operating systems.

The SET-COMPARISON and/or SET-INTERSECTION matching rules may not be supported by some managed object instances which include this attribute.!

A.4.4.37 PDUs Forwarded Counter

pdusForwardedCounter ATTRIBUTE

DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2 : 1992": counter;
BEHAVIOUR pdusForwardedCounterBehaviour;

REGISTERED AS {x-attribute 37};

pdusForwardedCounterBehaviour BEHAVIOUR

DEFINED AS

!This attribute specifies the number of valid incoming PDUs which were forwarded (transmitted as outgoing PDUs) to another destination. This attribute does not count incoming PDUs which were delivered to a local service user.!

A.4.4.38 PDUs Reassembled Ok Counter

pdusReasmbldOKCounter ATTRIBUTE

DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2 : 1992": counter;
BEHAVIOUR pdusReasmbldOKCounterBehaviour;

REGISTERED AS {x-attribute 38};

pdusReasmbldOKCounterBehaviour BEHAVIOUR

DEFINED AS

!This attribute specifies the number of PDUs that were reassembled successfully by a protocol layer entity.!

A.4.4.39 PDUs Reassembled Fail Counter

pdusReasmbldFailCounter ATTRIBUTE

DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2 : 1992": counter;
BEHAVIOUR pduReasmbldFailCounterBehaviour;

REGISTERED AS {x-attribute 39};

pduReasmbldFailCounterBehaviour BEHAVIOUR

DEFINED AS

!This attribute specifies the number of valid PDUs received by a protocol layer entity but discarded due to reassembly failure. This attribute counts only incoming PDUs which were recognized as valid segments of an SDU, but which were discarded during reassembly (for example, due to reassembly time expiration).!;

A.4.4.40 PDUs Discarded Counter

pduDiscardedCounter ATTRIBUTE

DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2 : 1992": counter;
BEHAVIOUR pduDiscardedCounterBehaviour;

REGISTERED AS {x-attribute 40};

pduDiscardedCounterBehaviour BEHAVIOUR

DEFINED AS

!This attribute specifies the number of invalid PDUs received and discarded by a protocol layer entity.!;

A.4.4.41 Peripheral List

peripheralList ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.AnyNamesBase;
MATCHES FOR EQUALITY, SET-COMPARISON, SET-INTERSECTION;
BEHAVIOUR peripheralListBehaviour;

REGISTERED AS {x-attribute 41};

peripheralListBehaviour BEHAVIOUR

DEFINED AS

!The Peripheral List attribute provides managed object instance information for peripheral devices accessible by a resource.

The Peripheral List attribute identifies the auxiliary devices that are used by a resource. This includes things such as disk drives, tape drives, printers, etc..

The following object classes (or their subclasses or allomorphic classes) are valid processing entities: OMNIPoint Equipment.

The SET-COMPARISON and/or SET-INTERSECTION matching rules may not be supported by some managed object instances which include this attribute.!;

A.4.4.42 Peripheral Name

peripheralName ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.AnyNameBase;
MATCHES FOR EQUALITY, SUBSTRINGS;
BEHAVIOUR peripheralNameBehaviour;

REGISTERED AS {x-attribute 42};

peripheralNameBehaviour BEHAVIOUR

DEFINED AS

!The Peripheral Name attribute provides information for peripheral devices accessible by a resource.

The Peripheral Name attribute identifies an auxiliary devices that is used by a resource. This includes things such as disk drives, tape drives, printers, etc..!;

A.4.4.43 Processing Entity List

processingEntityList ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.AnyNamesBase;
MATCHES FOR EQUALITY, SET-COMPARISON, SET-INTERSECTION;
BEHAVIOUR processingEntityListBehaviour;

REGISTERED AS {x-attribute 43};

processingEntityListBehaviour BEHAVIOUR

DEFINED AS

!The Processing Entity List attribute specifies the processing entities which may be used by the containing object instance but which are not contained in (i.e., processing entities which are shared among systems). The following object classes (or their subclasses or allomorphic classes) are valid processing entities: processingEntity.

The SET-COMPARISON and/or SET-INTERSECTION matching rules may not be supported by some managed object instances which include this attribute.!

A.4.4.44 Processing Entity Name

processingEntityName ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.AnyNameBase;
MATCHES FOR EQUALITY, SUBSTRINGS;
BEHAVIOUR processingEntityNameBehaviour;

REGISTERED AS {x-attribute 44};

processingEntityNameBehaviour BEHAVIOUR

DEFINED AS

!The Processing Entity Name attribute specifies the processing entity which may be used by the containing object instance but which is not contained in (i.e., processing entities which are shared among systems).!;

A.4.4.45 Product Label

productLabel ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.GraphicStringBase;
MATCHES FOR EQUALITY, SUBSTRINGS;
BEHAVIOUR productLabelBehaviour;

REGISTERED AS {x-attribute 45};

productLabelBehaviour BEHAVIOUR

DEFINED AS

!The productLabel attribute specifies the product number or identifying string (e.g., model number) of the underlying resource.!

A.4.4.46 Remote Network Address

remoteNetworkAddress ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.Address;
MATCHES FOR EQUALITY, SUBSTRINGS;
BEHAVIOUR remoteNetworkAddressBehaviour;

REGISTERED AS {x-attribute 46};

remoteNetworkAddressBehaviour BEHAVIOUR

DEFINED AS

!The remoteNetworkAddress attribute identifies the remote network address of a transport connection (e.g., remote IP address for TCP or the remote NSAP address for OSI).!

A.4.4.47 Remote Transport Connection Endpoint

remoteTransportConnectionEndpoint ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.Address;
MATCHES FOR EQUALITY, SUBSTRINGS;
BEHAVIOUR remoteTransportConnectionEndpointBehaviour;

REGISTERED AS {x-attribute 47};

remoteTransportConnectionEndpointBehaviour BEHAVIOUR

DEFINED AS

!This attribute identifies the remote transport connection endpoint (e.g., the destination port for TCP or the remote t-selector for OSI Transport protocol).!

A.4.4.48 Retransmission Time

retransmissionTime ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.HundredthsOfSec;
MATCHES FOR EQUALITY, ORDERING;
BEHAVIOUR retransmissionTimeBehaviour;

REGISTERED AS {x-attribute 48};

retransmissionTimeBehaviour BEHAVIOUR

DEFINED AS

!This attribute specifies the current value (in 1/100ths of a second) of the retransmission timer used by a transport connection.!

A.4.4.49 Retransmission Timer Initial Value

retransmissionTimerInitialValue ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.HundredthsOfSec;
MATCHES FOR EQUALITY, ORDERING;
BEHAVIOUR retransmissionTimerInitialValueBehaviour;

REGISTERED AS {x-attribute 49};

retransmissionTimerInitialValueBehaviour BEHAVIOUR

DEFINED AS

!This attribute specifies the initial value (in 1/100ths of a second) of the retransmission timer used by a transport connection.!

A.4.4.50 Serial Number

serialNumber ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.GraphicStringBase;
MATCHES FOR EQUALITY, SUBSTRINGS;
BEHAVIOUR serialNumberBehaviour;

REGISTERED AS {x-attribute 50};

serialNumberBehaviour BEHAVIOUR

DEFINED AS

!The serialNumber attribute provides the serial number of the underlying resource.!

A.4.4.51 Service List

serviceList ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.AnyNamesBase;
MATCHES FOR SET-COMPARISON, SET-INTERSECTION;
BEHAVIOUR serviceListBehaviour;

REGISTERED AS {x-attribute 51};

serviceListBehaviour BEHAVIOUR

DEFINED AS

!The Service List attribute provides managed object instance information about one or more services. The following object classes (or any of their subclasses or allomorphic classes) are valid as services: "OP1 Library Vol. 4":Service.

The SET-COMPARISON and/or SET-INTERSECTION matching rules may not be supported by some managed object instances which include this attribute.!

A.4.4.52 Service Name

serviceName ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.AnyNameBase;
MATCHES FOR EQUALITY, SUBSTRINGS;
BEHAVIOUR serviceNameBehaviour;

REGISTERED AS {x-attribute 52};

serviceNameBehaviour BEHAVIOUR

DEFINED AS

!The Service Name attribute provides information about one service.!

A.4.4.53 Software List

softwareList ATTRIBUTE

```
WITH ATTRIBUTE SYNTAX SYNTAX-1.AnyNamesBase;  
MATCHES FOR SET-COMPARISON, SET-INTERSECTION;  
BEHAVIOUR softwareListBehaviour;
```

REGISTERED AS {x-attribute 53};

softwareListBehaviour BEHAVIOUR

DEFINED AS

!The Software List attribute identifies those software components that run on or are considered part of the equipment. (There is no corresponding managed object class at this time.)

The SET-COMPARISON and/or SET-INTERSECTION matching rules may not be supported by some managed object instances which include this attribute.!

A.4.4.54 Software Name

softwareName ATTRIBUTE

```
WITH ATTRIBUTE SYNTAX SYNTAX-1.AnyNameBase;  
MATCHES FOR EQUALITY, SUBSTRINGS;  
BEHAVIOUR softwareNameBehaviour;
```

REGISTERED AS {x-attribute 54};

softwareNameBehaviour BEHAVIOUR

DEFINED AS

!The Software Name attribute identifies the software component that runs on or are considered part of the equipment.!

A.4.4.55 System Time

systemTime ATTRIBUTE

```
WITH ATTRIBUTE SYNTAX SYNTAX-1.GeneralTime;  
MATCHES FOR EQUALITY, ORDERING;  
BEHAVIOUR systemTimeBehaviour;
```

REGISTERED AS {x-attribute 55};

systemTimeBehaviour BEHAVIOUR

DEFINED AS

!The systemTime attribute specifies the current time clocked at the resource.!

A.4.4.56 Transport Connection Id

transportConnectionId ATTRIBUTE

```
WITH ATTRIBUTE SYNTAX SYNTAX-1.GraphicStringBase;  
MATCHES FOR EQUALITY, SUBSTRINGS;  
BEHAVIOUR transportConnectionIdBehaviour;
```

REGISTERED AS {x-attribute 56};

transportConnectionIdBehaviour BEHAVIOUR

DEFINED AS

!The transportConnectionId attribute is the distinguishing attribute for the transportConnection managed object class.!

A.4.4.57 Transport Connection Reference

transportConnectionReference ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.IntegerBase;
MATCHES FOR EQUALITY;
BEHAVIOUR transportConnectionReferenceBehaviour;

REGISTERED AS {x-attribute 57};

transportConnectionReferenceBehaviour BEHAVIOUR

DEFINED AS

!This attribute identifies the local transport connection reference that is established by the two transport connection endpoints (e.g., the local socket number for TCP or the local connection reference for OSI).!;

A.4.4.58 Transport Entity Type

transportEntityType ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.TransportEntityType;
MATCHES FOR EQUALITY;
BEHAVIOUR transportEntityTypeBehaviour;

REGISTERED AS {x-attribute 58};

transportEntityTypeBehaviour BEHAVIOUR

DEFINED AS

!The transportEntityType attribute indicates the type of the transport protocol layer entity.!

A.4.4.59 Type Text

typeText ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.GraphicStringBase;
MATCHES FOR EQUALITY, SUBSTRINGS;
BEHAVIOUR typeTextBehaviour;

REGISTERED AS {x-attribute 59};

typeTextBehaviour BEHAVIOUR

DEFINED AS

!The typeText attribute serves to supplement and refine individual managed object class attributes. If none of the named items defined for the "type" attribute are appropriate, or the "type" attribute requires refinement, the typeText attribute contains supplemental information.!

A.4.4.60 Up Time

upTime ATTRIBUTE

WITH ATTRIBUTE SYNTAX SYNTAX-1.IntegerBase;
MATCHES FOR EQUALITY, ORDERING;
BEHAVIOUR upTimeBehaviour;

REGISTERED AS {x-attribute 60};

upTimeBehaviour BEHAVIOUR

DEFINED AS

!The upTime attribute specifies the time interval (in seconds) that has elapsed since the entity's operational state changed to "enabled", or since the time that the entity was created in the "enabled" state.!

A.4.4.61 Vendor List

vendorList **ATTRIBUTE**

WITH ATTRIBUTE SYNTAX SYNTAX-1.AnyNamesBase;
MATCHES FOR SET-COMPARISON, SET-INTERSECTION;
BEHAVIOUR vendorListBehaviour;

REGISTERED AS (x-attribute 61);

vendorListBehaviour **BEHAVIOUR**

DEFINED AS

!The Vendor List attribute provides managed object instance information about a set of vendor organizations. The following classes (or any of their subclasses or allomorphic classes) are valid as vendors: "OP1 Library Vol. 4":Vendor.

The SET-COMPARISON and/or SET-INTERSECTION matching rules may not be supported by some managed object instances which include this attribute.!

A.4.5 Actions**A.4.5.1 Activate**

-- Copied from ISO/IEC DIS 10737, should be replaced by reference to standard
-- definition when/if this ACTION is registered in a final IS version.

activate **ACTION**

BEHAVIOUR activateBehaviour;
MODE CONFIRMED;
WITH REPLY SYNTAX SYNTAX-1.ActivateActionReply;

REGISTERED AS { x-action 1 };

activateBehaviour **BEHAVIOUR**

DEFINED AS

!This action initializes the operation of the resource. As a result of the action, the sequence of operations necessary to cause the resource to enter its operational mode shall be initiated. These may include, for example, checks against attribute constraint violation and checks on the validity of relationship attributes (cross-layer and other). If these operations are successfully initiated, the administrative state (if present) shall be changed to "unlocked" and the value "successResponse" shall be returned in the responseCode parameter of the action reply. If these operations cannot be successfully initiated, the value "failureResponse" shall be returned, together with a failure reason parameter describing the reason for the failure. On successful completion of these operations, the operational state shall have the value "enabled". Depending upon the current state of the resource when the action is attempted, some or all of the above operations may be unnecessary.!

A.4.5.2 Deactivate

-- Copied from ISO/IEC DIS 10737, should be replaced by reference to standard
-- definition when/if this ACTION is registered in a final IS version.

deactivate ACTION

 BEHAVIOUR deactivateBehaviour;
 MODE CONFIRMED;
 WITH REPLY SYNTAX SYNTAX-1.ActivateActionReply;

REGISTERED AS { x-action 2 };

deactivateBehaviour BEHAVIOUR

DEFINED AS

!This action terminates the operation of the resource. As a result of the action, the sequence of operations necessary to cause the resource to cease operation shall be initiated. If these operations are successfully initiated, the administrative state (if present) shall be changed to "locked" and the value "successResponse" shall be returned in the responseCode parameter of the action reply. If these operations cannot be successfully initiated, the value "failureResponse" shall be returned, together with a failure reason parameter describing the reason for the failure. On successful completion of these operations, the operational state shall have the value "disabled". Depending upon the current state of the resource when the action is attempted, some or all of the above operations may be unnecessary.!

A.4.6 Parameters**A.4.6.1 Transport Disconnect Cause**

transportDisconnectCause PARAMETER

 CONTEXT EVENT-INFO;
 WITH SYNTAX SYNTAX-1.Cause;
 BEHAVIOUR causeBehaviour;

REGISTERED AS { x-parameter 1 };

causeBehaviour BEHAVIOUR

DEFINED AS

!This parameter specifies the reason why a transport connection was deleted. It may be included in the Additional Information parameter of the objectDeletion notification.!

A.4.7 Syntax Definitions

SYNTAX-1 { x-module 1 }

DEFINITIONS IMPLICIT TAGS ::= BEGIN

IMPORTS DistinguishedName FROM InformationFramework {joint-iso-ccitt ds(5) modules(1)
informationFramework(1)} ObjectInstance FROM CMIP-1 {joint-iso-ccitt ms(9) cmip(1) modules(0) protocol(3)};

-- EXPORTS everything

-- The following OIDs are allocated from the OIW NMSIG registration arc,

-- for use in registering harmonized OIW/NMF definitions.

```

rmsig      OBJECT IDENTIFIER ::= { iso identified-organization(3) oiw(14) rmsig(2) }
op1LibraryVol1 OBJECT IDENTIFIER ::= { rmsig 2 }
x-module   OBJECT IDENTIFIER ::= { op1LibraryVol1 0 }
x-objectClass OBJECT IDENTIFIER ::= { op1LibraryVol1 1 }
x-package  OBJECT IDENTIFIER ::= { op1LibraryVol1 2 }
x-nameBinding OBJECT IDENTIFIER ::= { op1LibraryVol1 3 }
x-attribute OBJECT IDENTIFIER ::= { op1LibraryVol1 4 }
x-attributeGroup OBJECT IDENTIFIER ::= { op1LibraryVol1 5 }
x-parameter OBJECT IDENTIFIER ::= { op1LibraryVol1 6 }
x-action    OBJECT IDENTIFIER ::= { op1LibraryVol1 7 }
x-notification OBJECT IDENTIFIER ::= { op1LibraryVol1 8 }
x-responseCode OBJECT IDENTIFIER ::= { op1LibraryVol1 9 }

```

-- By convention, the postfix "base" is used when defining base types which appear
 -- as syntax labels in ATTRIBUTE templates and the postfix "range" is used when defining
 -- constrained types which appear as syntax labels in PERMITTED VALUES clauses.

```

ActivateActionReply ::= SEQUENCE {
    responseCode      OBJECT IDENTIFIER,
    responseArgs      SET OF Parameter OPTIONAL
}

```

```

-- OBJECT IDENTIFIER values used with ActivateActionReply --
failureResponse OBJECT IDENTIFIER ::= { x-responseCode 1 }
successResponse  OBJECT IDENTIFIER ::= { x-responseCode 2 }

```

```

Address ::= OCTET STRING

```

```

AddressingSizeBase ::= CHOICE {
    unknown          NULL,
    addressingSize   IntegerBase -- measured in bits
}

```

```

AddressingSizeRange ::= CHOICE {
    unknown          NULL,
    addressingSize   IntegerBase (1..64) -- measured in bits
}

```

```

AnyNamesBase ::= SET OF ObjectInstance
AnyNameBase  ::= GraphicStringBase

```

```

AnyNamesRange ::= SET SIZE(0..64) OF ObjectInstance
AnyNameRange  ::= GraphicString64

```

```

Cause ::= SEQUENCE {
    who INTEGER {
        unknown (0),
        user    (1),
        provider (2)
    },
    why INTEGER {
        unknown (0),
        excessiveIdle (1),

```

```

                                excessiveRetransmissions (2)
                                }}

Endianness                    ::= ENUMERATED {
                                big      (1),
                                little   (2)
                                }

EquipmentIdRange              ::= CHOICE {
--      based on "Rec. M.3100 : 1992" ASN.1 Module NameType
                                numericName Integer32,
                                pString    GraphicString64
                                }

GeneralTime                   ::= GeneralizedTime

GraphicStringBase              ::= GraphicString
GraphicString16                ::= GraphicStringBase(SIZE(0..16))
GraphicString32                ::= GraphicStringBase(SIZE(0..32))
GraphicString64                ::= GraphicStringBase(SIZE(0..64))

HundredthsOfSec               ::= IntegerBase

IntegerBase                    ::= INTEGER
Integer32                     ::= IntegerBase(0..4294967295)

MemorySizeBase                 ::= CHOICE {
                                unknown NULL,
                                size      IntegerBase -- measured in kilobytes
                                }

MemorySizeRange ::= CHOICE {
                                unknown NULL,
                                size      Integer32 -- measured in kilobytes
                                }

NetworkEntityType              ::= INTEGER { other      (0),
                                oSI-clnp      (1),
                                internet-IP    (2)
                                } (0..255)

NetworkAddresses               ::= SET OF Address

OsInfoBase                     ::= SET OF SEQUENCE
                                {
                                    osName      GraphicStringBase,
                                    osRelease   GraphicStringBase
                                }

OsInfoRange                    ::= SET OF SEQUENCE
                                {
                                    osName      GraphicString64,

```

```

                                osRelease GraphicString64
                                }

Parameter ::= SEQUENCE {
                paramId    OBJECT IDENTIFIER,
                paramInfo  ANY DEFINED BY paramId
            }

PercentageRange ::= IntegerBase (0..100)

TransportAddresses ::= SET OF TransportAddress

TransportAddress ::= SEQUENCE {
    transportConnectionEndpoint Address,
    networkAddress              Address
}

TransportEntityType ::= INTEGER { other      (0),
                                oSI-TP      (1),
                                tCP          (2),
                                sNA          (3)
                                } (0..255)

```

END

A.4.8 Inheritance & Naming Trees

This section provides graphic depictions for the inheritance and naming trees that are defined in the previous sections.

A.4.8.1 Inheritance Tree

```

top ---+--- opEquipment ----- processingEntity
      |
      +--- computerSystem
      |
      +--- opNetwork
      |
      +--- coTransportProtocolLayerEntity
      |
      +--- clNetworkProtocolLayerEntity
      |
      +--- transportConnection

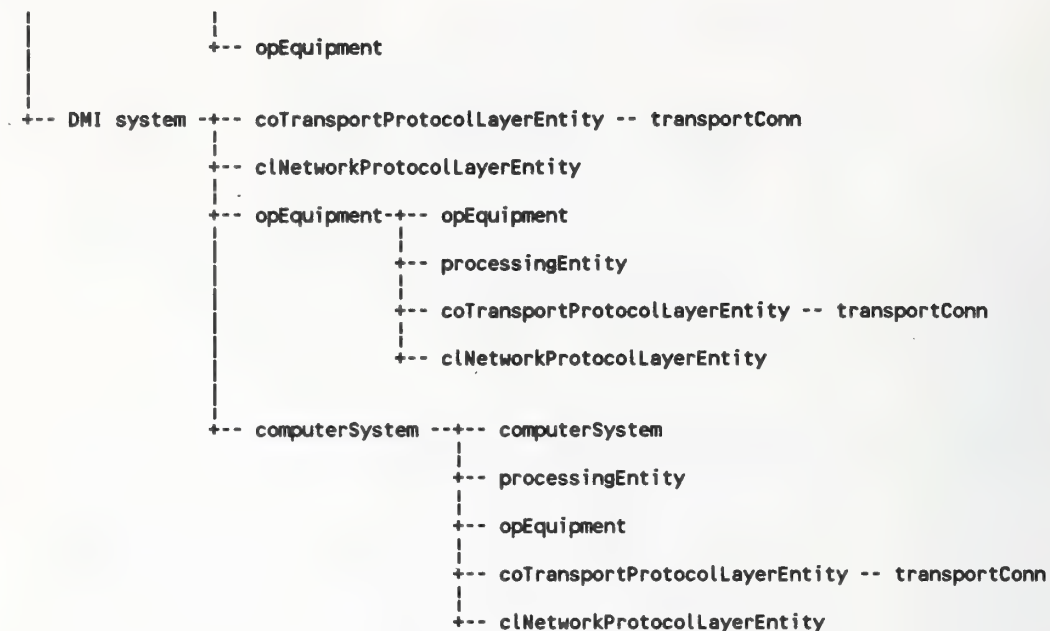
```

A.4.8.2 Naming Tree

```

root ---+--- opNetwork ---+--- opNetwork
      |                   |
      |                   +--- computerSystem

```



A.5 OIW NMSIG IVMO Definitions

The definitions specified in this clause can be referenced by using the label "OP1 Library Vol. 2" (e.g., "OP1 Library Vol. 2":transportConnectionIVMO).

A.5.1 Managed Object Classes and Mandatory Packages

A.5.1.1 Transport Connection IVMO

transportConnectionIVMO MANAGED OBJECT CLASS

DERIVED FROM "Rec. X.721 | ISO/IEC 10165-2 : 1992":top;
CHARACTERIZED BY transportConnectionIVMO-Package;

REGISTERED AS {y-objectClass 1};

transportConnectionIVMO-Package PACKAGE

BEHAVIOUR transportConnectionIVMO-behaviour;

ATTRIBUTES

transportConnectionIVMOId GET,

"OP1 Library Vol. 1":inactivityTimeout PERMITTED VALUES SYNTAX-1.Integer32 GET-REPLACE,

"OP1 Library Vol. 1":maxPDUSize PERMITTED VALUES SYNTAX-1.Integer32 GET-REPLACE;

NOTIFICATIONS

"Rec. X.721 | ISO/IEC 10165-2 : 1992":objectCreation,

"Rec. X.721 | ISO/IEC 10165-2 : 1992":objectDeletion,

"Rec. X.721 | ISO/IEC 10165-2 : 1992":attributeValueChange;;

transportConnectionIVMO-behaviour BEHAVIOUR

DEFINED AS

!This managed object class is an IVMO (Initial Value Managed Object class). It represents the collection of characteristic attributes which supply default and initially advertised attribute values to be used by instances of the Transport Connection managed object class when they are created. There can be only one instance of the Transport Connection IVMO managed object class for each instance of the CO Transport Protocol Layer Entity managed object class. Each Transport Connection IVMO instance may provide initial attribute values for newly-created Transport Connection instances with the same superior.

The Attribute List parameter of the ObjectCreation notification shall contain all the attributes of the created transport connection IVMO instance.

The Attribute List parameter of the ObjectDeletion notification shall contain all the attributes of the deleted transport connection IVMO instance.

Attributes that are subject to the AttributeValueChange notification are : "OP1 Library Vol. 1":inactivityTimeout, "OP1 Library Vol. 1":maxPDUSize. All attributeValueChange notifications shall include the Attribute Identifier List parameter.!

A.5.1.2 Transport Connection Retransmission IVMO

transportConnectionRetransmissionIVMO MANAGED OBJECT CLASS

DERIVED FROM transportConnectionIVMO;
CHARACTERIZED BY transportConnectionIVMO-Package;

REGISTERED AS (y-objectClass 2);

transportConnectionRetransmissionIVMO-Package PACKAGE

BEHAVIOUR transportConnectionIVMO-behaviour;
ATTRIBUTES

"OP1 Library Vol. 1":maxRetransmissions PERMITTED VALUES SYNTAX-1.Integer32 GET-REPLACE,
"OP1 Library Vol. 1":retransmissionTimerInitialValue
PERMITTED VALUES SYNTAX-1.Integer32 GET-REPLACE;;

transportConnectionRetransmissionIVMO-behaviour BEHAVIOUR

DEFINED AS

!This managed object class is an IVMO (Initial Value Managed Object class). It represents the collection of characteristic attributes which supply default and initially advertised attribute values to be used by instances of the Transport Connection managed object class that support retransmission, when they are created. There can be only one instance of the Transport Connection Retransmission IVMO managed object class for each instance of the CO Transport Protocol Layer Entity managed object class. Each Transport Connection Retransmission IVMO instance may provide initial attribute values for newly-created Transport Connection instances with the same superior.

Attributes, additional to those inherited from the transport connection IVMO managed object class, that are subject to the AttributeValueChange notification are : "OP1 Library Vol. 1":maxRetransmissions, "OP1 Library Vol. 1":retransmissionTimerInitialValue.!

A.5.2 Name Bindings

A.5.2.1 Transport Connection IVMO Name Bindings

```
transportConnectionIVMO-coTransportProtocolLayerEntity NAME BINDING
  SUBORDINATE OBJECT CLASS transportConnectionIVMO AND SUBCLASSES;
  NAMED BY
    SUPERIOR OBJECT CLASS "OP1 Library Vol. 1":coTransportProtocolLayerEntity AND SUBCLASSES;
  WITH ATTRIBUTE transportConnectionIVMOId;
REGISTERED AS {y-nameBinding 1};
```

A.5.2.2 Transport Connection Retransmission IVMO Name Bindings

```
transportConnectionRetransmissionIVMO-coTransportProtocolLayerEntity NAME BINDING
  SUBORDINATE OBJECT CLASS transportConnectionRetransmissionIVMO
  AND SUBCLASSES;
  NAMED BY
    SUPERIOR OBJECT CLASS "OP1 Library Vol. 1":coTransportProtocolLayerEntity AND SUBCLASSES;
  WITH ATTRIBUTE transportConnectionIVMOId;
REGISTERED AS {y-nameBinding 2};
```

A.5.3 Attributes**A.5.3.1 Transport Connection IVMO Id**

```
transportConnectionIVMOId ATTRIBUTE
  WITH ATTRIBUTE SYNTAX SYNTAX-1.GraphicStringBase;
  MATCHES FOR EQUALITY, SUBSTRINGS;
  BEHAVIOUR transportConnectionIVMOIdBehaviour;
```

```
REGISTERED AS {y-attribute 1};
```

```
transportConnectionIVMOIdBehaviour BEHAVIOUR
```

```
DEFINED AS !This attribute is the distinguishing attribute for the managed object class
transportConnectionIVMO.!
```

A.5.4 Syntax Definitions

```
SYNTAX-2 { y-module 1 }
DEFINITIONS IMPLICIT TAGS ::= BEGIN
```

```
-- EXPORTS everything
```

```
-- The following OIDs are allocated from the OIW NMSIG registration arc,
-- for use in registering OIW NMSIG MIL definitions.
```

```

nmsig          OBJECT IDENTIFIER ::= { iso identified-organization(3) oiw(14) nmsig(2) }
op1LibraryVol2 OBJECT IDENTIFIER ::= { nmsig 1 }
y-module       OBJECT IDENTIFIER ::= { op1LibraryVol2 0 }
y-objectClass  OBJECT IDENTIFIER ::= { op1LibraryVol2 1 }
y-package      OBJECT IDENTIFIER ::= { op1LibraryVol2 2 }
y-nameBinding  OBJECT IDENTIFIER ::= { op1LibraryVol2 3 }
y-attribute    OBJECT IDENTIFIER ::= { op1LibraryVol2 4 }
y-attributeGroup OBJECT IDENTIFIER ::= { op1LibraryVol2 5 }
```

```

y-parameter      OBJECT IDENTIFIER ::= { op1LibraryVol2 6 }
y-action         OBJECT IDENTIFIER ::= { op1LibraryVol2 7 }
y-notification   OBJECT IDENTIFIER ::= { op1LibraryVol2 8 }

```

END

A.5.5 Inheritance & Naming Trees

This section provides graphic depictions for the inheritance and naming trees that are defined in the previous sections.

A.5.5.1 Inheritance Tree

```

top ---- transportConnectionIVMO ----- transportConnectionRetransmissionIVMO

```

A.5.5.2 Naming Tree

```

coTransportProtocolLayerEntity --- transportConnection
                                |
                                +-- transportConnectionIVMO
                                |
                                +-- transportConnectionRetransmissionIVMO

```

A.6 OIW NMSIG Shared Management Knowledge (SMK) Definitions

(Refer to the Working Implementation Agreements Document.)

Annex B (informative)

NMSIG Object Identifiers

(Refer to the Working Implementation Agreements Document for additional information.)

B.1 Introduction

This Annex (B) specifies object identifier component values which are globally unambiguous. These object identifiers are to be used when referencing NMSIG-specified information objects. As defined in Part 6 of these agreements, the OIW has assigned the following object identifier for use by the NMSIG:

{ iso(1) identified-organization(3) oiw(14) nmsig(2) }

The following object identifiers are assigned under the { iso identified-organization oiw nmsig } node, labelled "nmsig".

Table B.1 - Object identifiers assigned under "nmsig" node

Identifier	Value	Reference
op1LibraryVol2	1	A.5
op1LibraryVol1	2	A.4

By inclusion of the managed object (MO) definitions and the object identifiers in Annex A and Annex B, respectively, of the Stable Implementors' Agreements (SIAs), these managed object (MO) definitions have become formally registered. Implementors of part 18 of the SIAs do not have to support any of these MOs. However, even though Annex A and Annex B are informative annexes, any implementation that claims to conform to these definitions must treat these definitions as normative and comply with the relevant portions of Annex A.4 and A.5, and Annex B.

B.2 Harmonized MIL Object Identifiers

Harmonized MIL Object Identifiers are assigned under the "nmsig" node as follows:

```

nmsig          OBJECT IDENTIFIER ::= { iso identified-organization(3) oiw(14) nmsig(2) }
op1LibraryVol1 OBJECT IDENTIFIER ::= { nmsig 2 }
x-module       OBJECT IDENTIFIER ::= { op1LibraryVol1 0 }
x-objectClass  OBJECT IDENTIFIER ::= { op1LibraryVol1 1 }
x-package      OBJECT IDENTIFIER ::= { op1LibraryVol1 2 }
x-nameBinding  OBJECT IDENTIFIER ::= { op1LibraryVol1 3 }
x-attribute    OBJECT IDENTIFIER ::= { op1LibraryVol1 4 }
x-attributeGroup OBJECT IDENTIFIER ::= { op1LibraryVol1 5 }
x-parameter    OBJECT IDENTIFIER ::= { op1LibraryVol1 6 }
x-action       OBJECT IDENTIFIER ::= { op1LibraryVol1 7 }
x-notification OBJECT IDENTIFIER ::= { op1LibraryVol1 8 }
x-responseCode OBJECT IDENTIFIER ::= { op1LibraryVol1 9 }

```

B.2.1 Object Class Object Identifiers

The following object identifiers are assigned under the { x-objectClass } node:

Table B.2 - Object identifiers assigned under "x-objectClass" node

Reference	Identifier	Value
A.4.1.1	computerSystem	1
A.4.1.2	coTransportProtocolLayerEntity	2
A.4.1.3	clNetworkProtocolLayerEntity	3
A.4.1.4	opEquipment	4
A.4.1.5	opNetwork	5
A.4.1.6	processingEntity	6
A.4.1.7	transportConnection	7

B.2.2 Package Object Identifiers

The following object identifiers are assigned under the { x-package } node:

Table B.3 - Object identifiers assigned under "x-package" node

Reference	Identifier	Value
A.4.2.1	addressingPkg	1
A.4.2.2	checksumPDUsDiscardedPkg	2
A.4.2.3	contactListPkg	3
A.4.2.4	contactNamePkg	4
A.4.2.5	cpuUtilizationPkg	5
A.4.2.6	customerListPkg	6
A.4.2.7	customerNamePkg	7
A.4.2.8	functionListPkg	8
A.4.2.9	functionNamePkg	9
A.4.2.10	incomingProtocolErrorPkg	10
A.4.2.11	locationPointerPkg	11
A.4.2.12	manufacturerListPkg	12
A.4.2.13	manufacturerNamePkg	13
A.4.2.14	maxPDUSizeIVPkg	14
A.4.2.15	maxRetransmissionsPkg	15

Reference	Identifier	Value
A.4.2.16	memorySizePkg	16
A.4.2.17	memoryUtilizationPkg	17
A.4.2.18	octetsRetransmittedPkg	18
A.4.2.19	opNetworkListPkg	19
A.4.2.20	opNetworkNamePkg	20
A.4.2.21	opVersionPkg	21
A.4.2.22	outgoingProtocolErrorPkg	22
A.4.2.23	pdusRetransmittedCounterPkg	23
A.4.2.24	pdusRetransmittedThresholdPkg	24
A.4.2.25	peripheralListPkg	25
A.4.2.26	peripheralNamePkg	26
A.4.2.27	processingEntityListPkg	27
A.4.2.28	processingEntityNamePkg	28
A.4.2.29	productLabelPkg	29
A.4.2.30	retransmissionTimePkg	30
A.4.2.31	retransmissionTimerInitialValuePkg	31
A.4.2.32	serialNumberPkg	32
A.4.2.33	serviceListPkg	33
A.4.2.34	serviceNamePkg	34
A.4.2.35	softwareListPkg	35
A.4.2.36	softwareNamePkg	36
A.4.2.37	systemTimePkg	37
A.4.2.38	typeTextPkg	38
A.4.2.39	upTimePkg	39
A.4.2.40	usageStatePkg	40
A.4.2.41	vendorListPkg	41

B.2.3 Name Bindings Object Identifiers

The following object identifiers are assigned under the { x-nameBinding } node:

Table B.4 - Object identifiers assigned under "x-nameBinding" node

Reference	Identifier	Value
A.4.3.2	computerSystem-system	1
A.4.3.2	computerSystem-opNetwork	2
A.4.3.2	computerSystem-computerSystem	3
A.4.3.3	coTransportProtocolLayerEntity-computerSystem	4
A.4.3.3	coTransportProtocolLayerEntity-system	5
A.4.3.3	coTransportProtocolLayerEntity-opEquipment	6
A.4.3.4	clNetworkProtocolLayerEntity-computerSystem	7
A.4.3.4	clNetworkProtocolLayerEntity-system	8
A.4.3.4	clNetworkProtocolLayerEntity-opEquipment	9
A.4.3.5	opEquipment-computerSystem	10
A.4.3.5	opEquipment-system	11
A.4.3.5	opEquipment-equipment	12
A.4.3.5	opEquipment-opNetwork	13
A.4.3.6	network-opNetwork-1	14
A.4.3.6	network-opNetwork-2	15
A.4.3.6	opNetwork-root	16
A.4.3.8	transportConnection-coTransportProtocolLayerEntity	17

B.2.4 Attribute Object Identifiers

The following object identifiers are assigned under the { x-attribute } node:

Table B.5 - Object identifiers assigned under "x-attribute" node

Reference	Identifier	Value
A.4.4.1	activeConnections	1
A.4.4.2	addressingSize	2
A.4.4.3	checksumPDUsDiscardedCounter	3
A.4.4.4	computerSystemId	4
A.4.4.5	clNetworkProtocolLayerEntityId	5
A.4.4.6	coTransportProtocolLayerEntityId	6
A.4.4.7	contactList	7

Reference	Identifier	Value
A.4.4.8	contactName	8
A.4.4.9	cpuType	9
A.4.4.10	cpuUtilization	10
A.4.4.11	customerList	11
A.4.4.12	customerName	12
A.4.4.13	endianess	13
A.4.4.14	functionList	14
A.4.4.15	functionName	15
A.4.4.16	inactivityTime	16
A.4.4.17	inactivityTimeout	17
A.4.4.18	localNetworkAddress	18
A.4.4.19	localNetworkAddresses	19
A.4.4.20	localTransportAddresses	20
A.4.4.21	localTransportConnectionEndpoint	21
A.4.4.22	locationPointer	22
A.4.4.23	manufacturerList	23
A.4.4.24	manufacturerName	24
A.4.4.25	maxConnections	25
A.4.4.26	maxPDUSize	26
A.4.4.27	maxRetransmissions	27
A.4.4.28	memorySize	28
A.4.4.29	memoryUtilization	29
A.4.4.30	networkEntityType	30
A.4.4.31	networkTitle	31
A.4.4.32	npduTimeToLive	32
A.4.4.33	opEquipmentList	33
A.4.4.34	opNetworkList	34
A.4.4.35	opNetworkName	35
A.4.4.36	osInfo	36
A.4.4.37	pdusForwardedCounter	37
A.4.4.38	pdusReasmbldOkCounter	38
A.4.4.39	pdusReasmbldFailCounter	39

Reference	Identifier	Value
A.4.4.40	pdusDiscardedCounter	40
A.4.4.41	peripheralList	41
A.4.4.42	peripheralName	42
A.4.4.43	processingEntityList	43
A.4.4.44	processingEntityName	44
A.4.4.45	productLabel	45
A.4.4.46	remoteNetworkAddress	46
A.4.4.47	remoteTransportConnectionEndpoint	47
A.4.4.48	retransmissionTime	48
A.4.4.49	retransmissionTimerInitialValue	49
A.4.4.50	serialNumber	50
A.4.4.51	serviceList	51
A.4.4.52	serviceName	52
A.4.4.53	softwareList	53
A.4.4.54	softwareName	54
A.4.4.55	systemTime	55
A.4.4.56	transportConnectionId	56
A.4.4.57	transportConnectionReference	57
A.4.4.58	transportEntityType	58
A.4.4.59	typeText	59
A.4.4.60	upTime	60
A.4.4.61	vendorList	61

B.2.5 Action Object Identifiers

The following object identifiers are assigned under the { x-action } node:

Table B.6 - Object identifiers assigned under "x-action" node

Reference	Identifier	Value
A.4.5.1	activate	1
A.4.5.2	deactivate	2

B.2.6 Parameter Object Identifiers

The following object identifiers are assigned under the { x-parameter } node:

Table B.7 - Object identifiers assigned under "x-parameter" node

Reference	Identifier	Value
A.4.6.1	transportDisconnectCause	1

B.2.7 Response Code Object Identifiers

The following object identifiers are assigned under the { x-responseCode } node:

Table B.8 - Object identifiers assigned under "x-responseCode" node

Reference	Identifier	Value
A.4.7	failureResponse	1
A.4.7	successResponse	2

B.2.8 Module Object Identifiers

The following object identifiers are assigned under the { x-module } node:

Table B.9 - Object identifiers assigned under "x-module" node

Reference	Identifier	Value
A.4.7	SYNTAX-1	1

B.3 Phase 1 MIL Object Identifiers

Phase 1 MIL Object Identifiers are assigned under the "nmsig" node as follows:

```

op1LibraryVol2 OBJECT IDENTIFIER ::= { nmsig 1 }
y-module       OBJECT IDENTIFIER ::= { op1LibraryVol2 0 }
y-objectClass  OBJECT IDENTIFIER ::= { op1LibraryVol2 1 }
y-package      OBJECT IDENTIFIER ::= { op1LibraryVol2 2 }
y-nameBinding  OBJECT IDENTIFIER ::= { op1LibraryVol2 3 }
y-attribute    OBJECT IDENTIFIER ::= { op1LibraryVol2 4 }
y-attributeGroup OBJECT IDENTIFIER ::= { op1LibraryVol2 5 }
y-parameter    OBJECT IDENTIFIER ::= { op1LibraryVol2 6 }
y-action       OBJECT IDENTIFIER ::= { op1LibraryVol2 7 }
y-notification OBJECT IDENTIFIER ::= { op1LibraryVol2 8 }

```

B.3.1 Object Class Object Identifiers

The following object identifiers are assigned under the { y-objectClass } node:

Table B.10 - Object identifiers assigned under "y-objectClass" node

Reference	Identifier	Value
A.5.1.1	transportConnectionIVMO	1
A.5.1.2	transportConnectionRetransmissionIVMO	2

B.3.2 Name Bindings Object Identifiers

The following object identifiers are assigned under the { y-nameBinding } node:

Table B.11 - Object identifiers assigned under "y-nameBinding" node

Reference	Identifier	Value
A.5.2.1	transportConnectionIVMO-coTransportProtocolLayerEntity	1
A.5.2.2	transportConnectionRetransmissionIVMO-coTransportProtocolLayerEntity	2

B.3.3 Attribute Object Identifiers

The following object identifiers are assigned under the { y-attribute } node:

Table B.12 - Object identifiers assigned under "y-attribute" node

Reference	Identifier	Value
A.5.3.1	transportConnectionIVMOId	1

B.3.4 Module Object Identifiers

The following object identifiers are assigned under the { y-module } node:

Table B.13 - Object identifiers assigned under "y-module" node

Reference	Identifier	Value
A.5.4	SYNTAX-2	1

Annex C (informative)

MOCS Proforma

C.1 Introduction

The purpose of this MOCS proforma is to provide a mechanism for a supplier of an implementation of these agreements which claims conformance to a managed object class to provide conformance information in a standard form.

C.2 Symbols, abbreviations, and terms

The MOCS proforma contained in this Annex is comprised of information in a tabular format in accordance with the guidelines presented in ISO/IEC 9646-2 [ATSS] and ISO/IEC 10165-6 [N1CS1].

The following common notations, defined in ISO/IEC 9646-2, are used for the status column.

c conditional
 m mandatory
 o optional
 x prohibited
 - not applicable

The following common notations, defined in ISO/IEC 9646-2, are used for the support column.

Ig the item is ignored (i.e., processed syntactically but not semantically)
 N not implemented
 Y implemented
 - not applicable

C.3 Instructions for completing the MOCS proforma to produce a MOCS

The supplier of the implementation shall enter an explicit statement in each of the boxes provided using the notation described in clause C.2. Additional instructions are provided in ISO/IEC 10165-6, Annex B.

C.4 Statements of Conformance to Managed Object Classes

This clause contains a MOCS Proforma for each managed object class defined in Annex A of these agreements, and registered by Annex B of these agreements.

C.4.1 Computer System MOCS Proforma

Managed Object class template label	Value of Object identifier for class
#OP1 Library Vol. 1":computerSystem	{ 1 3 14 2 2 1 1 }

Are all mandatory features of the class supported? Yes _____
 No _____

Table C.4.1.1 - Name Binding Support

Index	Name Binding Template Label	Value of Object Identifier for Name Binding	Superior Object Class Template Label	Status	Support	Status				Additional Information
						create	delete	create	delete	
C.4.1.1.1	computerSystem-system	C 1 3 14 2 2 3 1 0	"Rac. X.721 ISO/IEC 10165-2 : 1992":system	0		m	m			
C.4.1.1.2	computerSystem-opNetwork	C 1 3 14 2 2 3 2 0	opNetwork	0		m	m			
C.4.1.1.3	computerSystem-computerSystem	C 1 3 14 2 2 3 3 0	computerSystem	0		m	m			

Table C.4.1.2 - Attribute Support

Index	Attribute Template Label	Value of Object Identifier for Attribute	Status					Support					Additional Information
			supported by the object	replaced	added	removed	supported by the object	replaced	added	removed	supported by the object	replaced	
C.4.1.2.1	peripheralName	{ 1 3 14 2 2 4 42 }	c3	c3	c3	x	x	x					
C.4.1.2.2	peripheralList	{ 1 3 14 2 2 4 41 }	c4	c4	c4	c4	c4	x					
C.4.1.2.3	processingEntityName	{ 1 3 14 2 2 4 44 }	c5	c5	c5	x	x	x					
C.4.1.2.4	processingEntityList	{ 1 3 14 2 2 4 43 }	c6	c6	c6	c6	c6	x					
C.4.1.2.5	systemTime	{ 1 3 14 2 2 4 55 }	x	c0	x	x	x	x					
C.4.1.2.6	upTime	{ 1 3 14 2 2 4 60 }	x	c0	x	x	x	x					
C.4.1.2.7	"Rec. N.3100 : 1992":userLabel	{ 0 0 13 3100 0 7 50 }	c0	c0	c0	x	x	x					
C.4.1.2.8	"Rec. X.721 ISO/IEC 10165-2 : 1992":usageState	{ 2 9 3 2 7 39 }	x	c7	x	x	x	x					
C.4.1.2.9	"Rec. X.721 ISO/IEC 10165-2 : 1992":operationalState	{ 2 9 3 2 7 35 }	x	m	x	x	x	x					
C.4.1.2.10	"Rec. X.721 ISO/IEC 10165-2 : 1992":administrativeState	{ 2 9 3 2 7 31 }	m	m	m	x	x	x					
C.4.1.2.11	"Rec. X.721 ISO/IEC 10165-2 : 1992":alarmStatus	{ 2 9 3 2 7 32 }	m	m	m	m	m	x					
C.4.1.2.12	"Rec. X.721 ISO/IEC 10165-2 : 1992":availabilityStatus	{ 2 9 3 2 7 33 }	x	m	x	x	x	x					
C.4.1.2.13	computerSystemId	{ 1 3 14 2 2 4 4 }	m	m	x	x	x	x					
C.4.1.2.14	"Rec. X.721 ISO/IEC 10165-2 : 1992":allomorphs	{ 2 9 3 2 7 50 }	c1	c1	x	x	x	x					
C.4.1.2.15	"Rec. X.721 ISO/IEC 10165-2 : 1992":nameBinding	{ 2 9 3 2 7 63 }	m	m	x	x	x	x					
C.4.1.2.16	"Rec. X.721 ISO/IEC 10165-2 : 1992":objectClass	{ 2 9 3 2 7 65 }	m	m	x	x	x	x					
C.4.1.2.17	"Rec. X.721 ISO/IEC 10165-2 : 1992":packages	{ 2 9 3 2 7 66 }	c2	c2	x	x	x	x					

c0 = m if an instance supports it, else -

c1 = m if an object supports allomorphism, else -

c2 = m if any any registered package (other than this package) has been instantiated, else -


```
c3 = m if an instance supports it and the peripheralListPkg is NOT present, else x  
c4 = m if an instance supports it and the peripheralNamePkg is NOT present, else x  
c5 = m if an instance supports it and the processingEntityListPkg is NOT present, else x  
c6 = m if an instance supports it and the processingEntityNamePkg is NOT present, else x  
c7 = m if a resource can detect usage, else -
```

Table C.4.1.3 - Attribute Group Support

Index	Attribute Group Template Label	Value of Object Identifier for Attribute Group	Status		Support		Additional Information
			g	s	a	s	
			e	e	d	e	
			t	t	t	t	
C.4.1.3.1	"Rec. X.721 ISO/IEC 10165-2 : 1992":state	(2 9 3 2 8 1)	m	x			

Table C.4.1.6 - Notification Support

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support		Additional Info	Sub-Index	Notification Field Name Label	Value of OID of Attribute associated with Field	Status	Support	Additional Information
				Con	Form							
C.4.1.5.1	"Rec. X.721 ISO/IEC 10165-2 : 1992"; attributeValueChange	(2 9 3 2 10 1)	m				C.4.1	additionalInfo	(2 9 3 2 7 6)			
							.5.1.	creation				
							C.4.1	additionalText	(2 9 3 2 7 7)			
							.5.1.					
							C.4.1	attributeIdentifierList	(2 9 3 2 7 8)			
							.5.1.					
							C.4.1	attributeValueChangeDefinition	(2 9 3 2 7 10)	m		
C.4.1.5.2	"Rec. X.721 ISO/IEC 10165-2 : 1992"; objectCreation	(2 9 3 2 10 6)	m				C.4.1	correlatedNotifications	(2 9 3 2 7 12)			
							.5.1.					
							C.4.1	notificationIdentifier	(2 9 3 2 7 16)			
							.5.1.					
							C.4.1	sourceIndicator	(2 9 3 2 7 26)			
							.5.1.					
							C.4.1	additionalInfo	(2 9 3 2 7 6)			
C.4.1.5.3	"Rec. X.721 ISO/IEC 10165-2 : 1992"; objectDeletion	(2 9 3 2 10 7)	m				.5.2.	creation				
							C.4.1	additionalText	(2 9 3 2 7 7)			
							.5.2.					
							C.4.1	attributeList	(2 9 3 2 7 9)			
							.5.2.					
							C.4.1	correlatedNotifications	(2 9 3 2 7 12)			
							.5.2.					
C.4.1.5.3	"Rec. X.721 ISO/IEC 10165-2 : 1992"; objectDeletion	(2 9 3 2 10 7)	m				C.4.1	notificationIdentifier	(2 9 3 2 7 16)			
							.5.2.					
							C.4.1	sourceIndicator	(2 9 3 2 7 26)			
							.5.2.					
							C.4.1	additionalInfo	(2 9 3 2 7 6)			
							.5.3.	creation				
							C.4.1	additionalText	(2 9 3 2 7 7)			
C.4.1.5.3	"Rec. X.721 ISO/IEC 10165-2 : 1992"; objectDeletion	(2 9 3 2 10 7)	m				.5.3.					
							C.4.1	attributeList	(2 9 3 2 7 9)			
							.5.3.					
							C.4.1	correlatedNotifications	(2 9 3 2 7 12)			
							.5.3.					
							C.4.1	notificationIdentifier	(2 9 3 2 7 16)			
							.5.3.					

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support		Add Info	Sub-Index	Notification Field Name Label	Value of OID of Attribute associated with Field	Status	Support	Additional Information
				Configuration	Notification							
C.4.1.5.4	"Rec. X.721 ISO/IEC 10165-2 : 1992": stateChange	{ 2 9 3 2 10 14 }	m				6	sourceIndicator	{ 2 9 3 2 7 26 }			
							7	additionalInformation	{ 2 9 3 2 7 6 }			
							8	additionalText	{ 2 9 3 2 7 7 }			
							9	attributeIdentifierList	{ 2 9 3 2 7 8 }			
							10	correlatedNotifications	{ 2 9 3 2 7 12 }			
							11	notificationIdentifier	{ 2 9 3 2 7 16 }			
							12	sourceIndicator	{ 2 9 3 2 7 26 }			
							13	stateChangeDefinition	{ 2 9 3 2 7 28 }	m		
C.4.1.5.5	"Rec. X.721 ISO/IEC 10165-2 : 1992": processingError Alarm	{ 2 9 3 2 10 10 }	m				1	additionalInformation	{ 2 9 3 2 7 6 }			
							2	additionalText	{ 2 9 3 2 7 7 }			
							3	backupObject	{ 2 9 3 2 7 41 }			
							4	backedUpStatus	{ 2 9 3 2 7 11 }			
							5	correlatedNotifications	{ 2 9 3 2 7 12 }			
							6	notificationIdentifier	{ 2 9 3 2 7 16 }			
							7	perceivedSeverity	{ 2 9 3 2 7 17 }	m		
							8	probableCause	{ 2 9 3 2 7 18 }	m		
							9	proposedRepairActions	{ 2 9 3 2 7 19 }			
							10	specificProblems	{ 2 9 3 2 7 27 }			
							11	stateChangeDefinition	{ 2 9 3 2 7 28 }			

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support Information	Add Info	Sub-Index	Notification Field Name Label	Value of OID of Attribute associated with Field	Status	Support	Additional Information
						C.4.1.5.5.12	thresholdInfo	(2 9 3 2 7 29)			
						C.4.1.5.5.13	trendIndication	(2 9 3 2 7 30)			
C.4.1.5.6	"Rec. X.721 ISO/IEC 10165-2 : 1992": environmentalAlarm	(2 9 3 2 10 3)	m			C.4.1.5.6.1	additionalInformation	(2 9 3 2 7 6)			
						C.4.1.5.6.2	additionalText	(2 9 3 2 7 7)			
						C.4.1.5.6.3	backUpObject	(2 9 3 2 7 41)			
						C.4.1.5.6.4	backedUpStatus	(2 9 3 2 7 11)			
						C.4.1.5.6.5	correlatedNotifications	(2 9 3 2 7 12)			
						C.4.1.5.6.6	notificationIdentifier	(2 9 3 2 7 16)			
						C.4.1.5.6.7	perceivedSeverity	(2 9 3 2 7 17)	m		
						C.4.1.5.6.8	probableCause	(2 9 3 2 7 18)	m		
						C.4.1.5.6.9	proposedRepairActions	(2 9 3 2 7 19)			
						C.4.1.5.6.10	specificProblems	(2 9 3 2 7 27)			
						C.4.1.5.6.11	stateChangeDefinition	(2 9 3 2 7 28)			
						C.4.1.5.6.12	thresholdInfo	(2 9 3 2 7 29)			
						C.4.1.5.6.13	trendIndication	(2 9 3 2 7 30)			
C.4.1.5.7	"Rec. X.721 ISO/IEC 10165-2 : 1992": equipmentAlarm	(2 9 3 2 10 4)	m			C.4.1.5.7.1	additionalInformation	(2 9 3 2 7 6)			
						C.4.1.5.7.2	additionalText	(2 9 3 2 7 7)			
						C.4.1.5.7.3	backUpObject	(2 9 3 2 7 41)			
						C.4.1.5.7.4	backedUpStatus	(2 9 3 2 7 11)			

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support	Add Info	Sub-Index	Notification Field Name Label	Value of OID of Attribute associated with Field	Status	Support	Additional Information
						5	C.4.1 correlatedNotifications	(2 9 3 2 7 12)			
						6	C.4.1 notificationId	(2 9 3 2 7 16)			
						7	C.4.1 perceivedSeverity	(2 9 3 2 7 17)			
						8	C.4.1 probableCause	(2 9 3 2 7 18)			
						9	C.4.1 proposedRepairActions	(2 9 3 2 7 19)			
						10	C.4.1 specificProblems	(2 9 3 2 7 27)			
						11	C.4.1 stateChangeDefinition	(2 9 3 2 7 28)			
						12	C.4.1 thresholdInfo	(2 9 3 2 7 29)			
						13	C.4.1 trendIndication	(2 9 3 2 7 30)			

C.4.2 Connection Oriented Transport Protocol Layer Entity MOCS Proforma

Managed Object class template label	Value of Object Identifier for class
*OP1 Library Vol. 1":coTransportProtocolLayerEntity	{ 1 3 14 2 2 1 2 }

Are all mandatory features of the class supported? Yes _____
 NO _____

Table C.4.2.1 - Name Binding Support

Index	Name Binding Template Label	Value of Object Identifier for Name Binding	Superior Object Class Template Label	Status	Support	Status				Additional Information
						create	delete	create	delete	
C.4.2.1.1	coTransportProtocolLayerEntity-computerSystem	{ 1 3 14 2 2 3 4 } 0	computerSystem	o		x	x			
C.4.2.1.2	coTransportProtocolLayerEntity-system	{ 1 3 14 2 2 3 5 } 0	"Rec. X.721 ISO/IEC 10165-2 : 1992":system	o		x	x			
C.4.2.1.3	coTransportProtocolLayerEntity-opEquipment	{ 1 3 14 2 2 3 6 } 0	opEquipment	o		x	x			

Table C.4.2.2 - Attribute Support

Index	Attribute Template Label	Value of Object Identifier for Attribute	Status					Support					Additional Information	
			set by create	get	replace	add	remove	set by create default	set by create	get	replace	add		remove
C.4.2.2.1	manufacturerList	{ 1 3 14 2 2 4 23 } 0	c3	c3	c3	c3	c3	x						
C.4.2.2.2	manufacturerName	{ 1 3 14 2 2 4 24 } 0	c4	c4	c4	x	x	x						
C.4.2.2.3	productLabel	{ 1 3 14 2 2 4 45 } 0	c0	c0	c0	x	x	x						
C.4.2.2.4	"Rec. M.3100 : 1992":version	{ 0 0 13 3100 0 7 52 } 0	c0	c0	c0	x	x	x						
C.4.2.2.5	serialNumber	{ 1 3 14 2 2 4 50 } 0	c0	c0	c0	x	x	x						
C.4.2.2.6	typeText	{ 1 3 14 2 2 4 59 } 0	c0	c0	c0	x	x	x						
C.4.2.2.7	upTime	{ 1 3 14 2 2 4 60 } 0	x	c0	x	x	x	x						
C.4.2.2.8	"Rec. X.721 ISO/IEC 10165-2 : 1992":incomingProtocolErrorCounter	{ 2 9 3 2 7 77 } 0	x	c0	x	x	x	x						
C.4.2.2.9	"Rec. X.721 ISO/IEC 10165-2 : 1992":outgoingProtocolErrorCounter	{ 2 9 3 2 7 85 } 0	x	c0	x	x	x	x						
C.4.2.2.10	checksumPDUsDiscardedCounter	{ 1 3 14 2 2 4 3 } 0	x	c0	x	x	x	x						
C.4.2.2.11	maxPDUSize	{ 1 3 14 2 2 4 26 } 0	c5	c5	c5	x	x	x						
C.4.2.2.12	"Rec. X.721 ISO/IEC 10165-2 : 1992":usageState	{ 2 9 3 2 7 39 } 0	x	c6	x	x	x	x						

Index	Attribute Template Label	Value of Object Identifier for Attribute	Status						Support						Additional Information
			set by create	get	replace	add	remove	set to default	set by create	get	replace	add	remove	set to default	
C.4.2.2.13	transportEntityType	{ 1 3 14 2 2 4 58 }	x	m	x	x	x	x							
C.4.2.2.14	localTransportAddresses	{ 1 3 14 2 2 4 20 }	x	m	x	x	x	x							
C.4.2.2.15	activeConnections	{ 1 3 14 2 2 4 1 }	x	m	x	x	x	x							
C.4.2.2.16	maxConnections	{ 1 3 14 2 2 4 25 }	x	m	x	x	x	x							
C.4.2.2.17	"Rec. X.721 ISO/IEC 10165-2 : 1992": outgoingConnectionRequestsCounter	{ 2 9 3 2 7 82 }	x	m	x	x	x	x							
C.4.2.2.18	"Rec. X.721 ISO/IEC 10165-2 : 1992": incomingConnectionRequestsCounter	{ 2 9 3 2 7 74 }	x	m	x	x	x	x							
C.4.2.2.19	"Rec. X.721 ISO/IEC 10165-2 : 1992": outgoingConnectionRejectErrorCounter	{ 2 9 3 2 7 81 }	x	m	x	x	x	x							
C.4.2.2.20	"Rec. X.721 ISO/IEC 10165-2 : 1992": incomingConnectionRejectErrorCounter	{ 2 9 3 2 7 73 }	x	m	x	x	x	x							
C.4.2.2.21	"Rec. X.721 ISO/IEC 10165-2 : 1992": outgoingDisconnectErrorCounter	{ 2 9 3 2 7 84 }	x	m	x	x	x	x							
C.4.2.2.22	"Rec. X.721 ISO/IEC 10165-2 : 1992": incomingDisconnectErrorCounter	{ 2 9 3 2 7 76 }	x	m	x	x	x	x							
C.4.2.2.23	"Rec. X.721 ISO/IEC 10165-2 : 1992": outgoingDisconnectCounter	{ 2 9 3 2 7 83 }	x	m	x	x	x	x							
C.4.2.2.24	"Rec. X.721 ISO/IEC 10165-2 : 1992": incomingDisconnectCounter	{ 2 9 3 2 7 75 }	x	m	x	x	x	x							
C.4.2.2.25	"Rec. X.721 ISO/IEC 10165-2 : 1992": octetsSentCounter	{ 2 9 3 2 7 80 }	x	m	x	x	x	x							
C.4.2.2.26	"Rec. X.721 ISO/IEC 10165-2 : 1992": octetsReceivedCounter	{ 2 9 3 2 7 78 }	x	m	x	x	x	x							
C.4.2.2.27	"Rec. X.721 ISO/IEC 10165-2 : 1992": operationalState	{ 2 9 3 2 7 35 }	x	m	x	x	x	x							
C.4.2.2.28	"Rec. X.721 ISO/IEC 10165-2 : 1992": administrativeState	{ 2 9 3 2 7 31 }	m	m	m	x	x	x							

Index	Attribute Template Label	Value of Object Identifier for Attribute	Status					Support					Additional Information
			set by create	get	replace	add	remove	set by default	get	replace	add	remove	
C.4.2.2.29	"Rec. X.721 ISO/IEC 10165-2 : 1992": alarmStatus	{ 2 9 3 2 7 32 }	m	m	m	m	m	x					
C.4.2.2.30	coTransportProtocolLayerId	{ 1 3 14 2 2 4 6 }	m	m	x	x	x	x					
C.4.2.2.31	"Rec. X.721 ISO/IEC 10165-2 : 1992": allomorphs	{ 2 9 3 2 7 50 }	c1	c1	x	x	x	x					
C.4.2.2.32	"Rec. X.721 ISO/IEC 10165-2 : 1992": nameBinding	{ 2 9 3 2 7 63 }	m	m	x	x	x	x					
C.4.2.2.33	"Rec. X.721 ISO/IEC 10165-2 : 1992": objectClass	{ 2 9 3 2 7 65 }	m	m	x	x	x	x					
C.4.2.2.34	"Rec. X.721 ISO/IEC 10165-2 : 1992": packages	{ 2 9 3 2 7 66 }	c2	c2	x	x	x	x					

c0 = m if an instance supports it, else -

c1 = m if an object supports allomorphism, else -

c2 = m if any any registered package (other than this package) has been instantiated, else -

c3 = m if an instance supports it and the manufacturerNamePkg is NOT present, else x

c4 = m if an instance supports it and the manufacturerListPkg is NOT present, else x

c5 = m if the "OP1 Library Vol. 2 : 1992":transportConnectionIVMO object class is not used to provide this initial value, else x

c6 = m if resource can detect usage, else -

Table C.4.2.3 - Attribute Group Support

Index	Attribute Group Template Label	Value of Object Identifier for Attribute Group	Status		Support		Additional Information
			get	set by default	get	set by default	
C.4.2.3.1	"Rec. X.721 ISO/IEC 10165-2 : 1992":state	{ 2 9 3 2 8 1 }	m	x			

Table C.4.2.5 - Notification Support

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support		Add Info	Sub-Index	Notification Field Name Label	Value of OID of Attribute associated with Field	Status	Support	Additional Information
				Conformant	Non-Conformant							
C.4.2.5.1	"Rec. X.721 ISO/IEC 10165-2 1992": attributeValueChange	(2 9 3 2 10 1)	m				C.4.2.5.1.1	additionalInformation	(2 9 3 2 7 6)			
							C.4.2.5.1.2	additionalText	(2 9 3 2 7 7)			
							C.4.2.5.1.3	attributeIdentifierList	(2 9 3 2 7 8)			
							C.4.2.5.1.4	attributeValueChangeDefinition	(2 9 3 2 7 10)			
							C.4.2.5.1.5	correlatedNotifications	(2 9 3 2 7 12)			
							C.4.2.5.1.6	notificationIdentifier	(2 9 3 2 7 16)			
							C.4.2.5.1.7	sourceIndicator	(2 9 3 2 7 26)			
C.4.2.5.2	"Rec. X.721 ISO/IEC 10165-2 1992": objectCreation	(2 9 3 2 10 6)	m				C.4.2.5.2.1	additionalInformation	(2 9 3 2 7 6)			
							C.4.2.5.2.2	additionalText	(2 9 3 2 7 7)			
							C.4.2.5.2.3	attributeList	(2 9 3 2 7 9)			
							C.4.2.5.2.4	correlatedNotifications	(2 9 3 2 7 12)			
							C.4.2.5.2.5	notificationIdentifier	(2 9 3 2 7 16)			
							C.4.2.5.2.6	sourceIndicator	(2 9 3 2 7 26)			
C.4.2.5.3	"Rec. X.721 ISO/IEC 10165-2 1992": objectDeletion	(2 9 3 2 10 7)	m				C.4.2.5.3.1	additionalInformation	(2 9 3 2 7 6)			
							C.4.2.5.3.2	additionalText	(2 9 3 2 7 7)			
							C.4.2.5.3.3	attributeList	(2 9 3 2 7 9)			
							C.4.2.5.3.4	correlatedNotifications	(2 9 3 2 7 12)			
							C.4.2.5.3.5	notificationIdentifier	(2 9 3 2 7 16)			

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support	Add Info	Sub-Index	Notification Field Name Label	Value of OID of Attribute associated with Field	Status	Support	Additional Information
						C.4.2.5.3.6	sourceIndicator	(2 9 3 2 7 0 26)			
C.4.2.5.4	"Rec. X.721 ISO/IEC 10165-2 1992": stateChange	(2 9 3 2 10 14)	m			C.4.2.5.4.1	additionalInformation	(2 9 3 2 7 0 6)			
						C.4.2.5.4.2	additionalText	(2 9 3 2 7 0 7)			
						C.4.2.5.4.3	attributeIdentifierList	(2 9 3 2 7 0 8)			
						C.4.2.5.4.4	correlatedNotifications	(2 9 3 2 7 0 12)			
						C.4.2.5.4.5	notificationIdentifier	(2 9 3 2 7 0 16)			
						C.4.2.5.4.6	sourceIndicator	(2 9 3 2 7 0 26)			
						C.4.2.5.4.7	stateChangeDefinition	(2 9 3 2 7 0 28)	m		
C.4.2.5.5	"Rec. X.721 ISO/IEC 10165-2 1992": processingErrorAlarm	(2 9 3 2 10 10)	m			C.4.2.5.5.1	additionalInformation	(2 9 3 2 7 0 6)			
						C.4.2.5.5.2	additionalText	(2 9 3 2 7 0 7)			
						C.4.2.5.5.3	backUpObject	(2 9 3 2 7 0 41)			
						C.4.2.5.5.4	backedUpStatus	(2 9 3 2 7 0 11)			
						C.4.2.5.5.5	correlatedNotifications	(2 9 3 2 7 0 12)			
						C.4.2.5.5.6	notificationIdentifier	(2 9 3 2 7 0 16)			
						C.4.2.5.5.7	perceivedSeverity	(2 9 3 2 7 0 17)	m		
						C.4.2.5.5.8	probableCause	(2 9 3 2 7 0 18)	m		
						C.4.2.5.5.9	proposedRepairActions	(2 9 3 2 7 0 19)			
						C.4.2.5.5.10	specificProblems	(2 9 3 2 7 0 27)			
						C.4.2.5.5.11	stateChangeDefinition	(2 9 3 2 7 0 28)			

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support	Add Info	Sub-Index	Notification Field Name Label	Value of OID of Attribute associated with Field	Status	Support	Additional Information
						C.4.2.5.5.12	thresholdInfo	(2 9 3 2 7 0 29)			
						C.4.2.5.5.13	trendIndication	(2 9 3 2 7 0 30)			

C.4.3 ConnectionlessNetwork Protocol Layer Entity MOCS Proforma

Managed Object class template label	Value of Object identifier for class
"Op1 Library Vol. 1":clNetworkProtocolLayerEntity	(1 3 14 2 2 1 3)

Are all mandatory features of the class supported? Yes _____
 No _____

Table C.4.3.1 - Name Binding Support

Index	Name Binding Template Label	Value of Object Identifier for Name Binding	Superior Object Class Template Label	Status	Support	Status	Support	Additional Information
						create	delete	
C.4.3.1.1	clNetworkProtocolLayerEntity-computerSystem	(1 3 14 2 2 3 7)	computerSystem	o		x	x	
C.4.3.1.2	clNetworkProtocolLayerEntity-system	(1 3 14 2 2 3 8)	"Rec. X.721 ISO/IEC 10165-2 : 1992":system	o		x	x	
C.4.3.1.3	clNetworkProtocolLayerEntity-opEquipment	(1 3 14 2 2 3 9)	opEquipment	o		x	x	

Table C.4.3.2 - Attribute Support

Index	Attribute Template Label	Value of Object Identifier for Attribute	Status					Support					Additional Information		
			create	get	replace	add	remove	set to default	create	get	replace	add		remove	set to default
C.4.3.2.1	manufacturerList	{ 1 3 14 2 2 4 23 }	c3	c3	c3	c3	c3	x							
C.4.3.2.2	manufacturerName	{ 1 3 14 2 2 4 24 }	c4	c4	c4	x	x	x							
C.4.3.2.3	productLabel	{ 1 3 14 2 2 4 45 }	c0	c0	c0	x	x	x							
C.4.3.2.4	"Rec. M.3100 : 1992":version	{ 0 0 13 3100 0 7 52 }	c0	c0	c0	x	x	x							
C.4.3.2.5	serialNumber	{ 1 3 14 2 2 4 50 }	c0	c0	c0	x	x	x							
C.4.3.2.6	typeText	{ 1 3 14 2 2 4 59 }	c0	c0	c0	x	x	x							
C.4.3.2.7	upTime	{ 1 3 14 2 2 4 60 }	x	c0	x	x	x	x							
C.4.3.2.8	networkEntityType	{ 1 3 14 2 2 4 30 }	x	m	x	x	x	x							
C.4.3.2.9	localNetworkAddresses	{ 1 3 14 2 2 4 19 }	x	m	m	m	m	x							
C.4.3.2.10	rPDUTimeToLive	{ 1 3 14 2 2 4 32 }	m	m	m	x	x	x							
C.4.3.2.11	"Rec. X.721 ISO/IEC 10165-2 : 1992":pdusSentCounter	{ 2 9 3 2 7 88 }	x	m	x	x	x	x							
C.4.3.2.12	"Rec. X.721 ISO/IEC 10165-2 : 1992":pdusReceivedCounter	{ 2 9 3 2 7 86 }	x	m	x	x	x	x							
C.4.3.2.13	"Rec. X.721 ISO/IEC 10165-2 : 1992":octetsSentCounter	{ 2 9 3 2 7 80 }	x	m	x	x	x	x							
C.4.3.2.14	"Rec. X.721 ISO/IEC 10165-2 : 1992":octetsReceivedCounter	{ 2 9 3 2 7 78 }	x	m	x	x	x	x							
C.4.3.2.15	pdusForwardedCounter	{ 1 3 14 2 2 4 37 }	x	m	x	x	x	x							
C.4.3.2.16	pdusReasmbldOKCounter	{ 1 3 14 2 2 4 38 }	x	m	x	x	x	x							
C.4.3.2.17	pdusReasmbldFailCounter	{ 1 3 14 2 2 4 39 }	x	m	x	x	x	x							
C.4.3.2.18	pdusDiscardedCounter	{ 1 3 14 2 2 4 40 }	x	m	x	x	x	x							
C.4.3.2.19	"Rec. X.721 ISO/IEC 10165-2 : 1992":operationalState	{ 2 9 3 2 7 35 }	x	m	x	x	x	x							
C.4.3.2.20	"Rec. X.721 ISO/IEC 10165-2 : 1992":administrativeState	{ 2 9 3 2 7 31 }	m	m	m	x	x	x							

Index	Attribute Template Label	Value of Object Identifier for Attribute	Status						Support						Additional Information
			s e t b y c r e a t e	s e t	r e p l a c e	a d d	r e m o v e	s e t b y c r e a t e	s e t b y c r e a t e	s e t	r e p l a c e	a d d	r e m o v e	s e t b y c r e a t e	
C.4.3.2.21	"Rec. X.721 ISO/IEC 10165-2 : 1992": alarmStatus	(2 9 3 2 7 32)	m	m	m	m	m	x							
C.4.3.2.22	clNetworkProtocolLayerId	(1 3 14 2 2 4 5)	m	m	x	x	x	x							
C.4.3.2.23	"Rec. X.721 ISO/IEC 10165-2 : 1992": allomorphs	(2 9 3 2 7 50)	c1	c1	x	x	x	x							
C.4.3.2.24	"Rec. X.721 ISO/IEC 10165-2 : 1992": nameBinding	(2 9 3 2 7 63)	m	m	x	x	x	x							
C.4.3.2.25	"Rec. X.721 ISO/IEC 10165-2 : 1992": objectClass	(2 9 3 2 7 65)	m	m	x	x	x	x							
C.4.3.2.26	"Rec. X.721 ISO/IEC 10165-2 : 1992": packages	(2 9 3 2 7 66)	c2	c2	x	x	x	x							

c0 = m if an instance supports it, else -

c1 = m if an object supports allomorphism, else -

c2 = m if any any registered package (other than this package) has been instantiated, else -

c3 = m if an instance supports it and the manufacturerNamePkg is NOT present, else x

c4 = m if an instance supports it and the manufacturerListPkg is NOT present, else x

Table C.4.3.3 - Attribute Group Support

Index	Attribute Group Template Label	Value of Object Identifier for Attribute Group	Status		Support		Additional Information
			get	set	get	set	
			default	default	default	default	
C.4.3.3.1	"Rec. X.721 ISO/IEC 10165-2 : 1992":state	(2 9 3 2 8 1)	m	x			

Table C.4.3.5 - Notification Support

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support		Add Info	Sub-Index	Notification Field Name Label	Value of OID of Attribute associated with field	Status	Support	Additional Information
				Conformant	Non-Conformant							
C.4.3.5.1	"Rec. X.721 ISO/IEC 10165-2 : 1992": attributeValueChange	{ 2 9 3 2 10 1 }	m				C.4.3.5.1	additionalInformation	{ 2 9 3 2 7 6 }			
							C.4.3.5.2	additionalText	{ 2 9 3 2 7 7 }			
							C.4.3.5.3	attributeIdentifierList	{ 2 9 3 2 7 8 }			
							C.4.3.5.4	attributeValueChangeDefinition	{ 2 9 3 2 7 10 }			
							C.4.3.5.5	correlatedNotifications	{ 2 9 3 2 7 12 }			
							C.4.3.5.6	notificationIdentifier	{ 2 9 3 2 7 16 }			
							C.4.3.5.7	sourceIndicator	{ 2 9 3 2 7 26 }			
C.4.3.5.2	"Rec. X.721 ISO/IEC 10165-2 : 1992": objectCreation	{ 2 9 3 2 10 6 }	m				C.4.3.5.1	additionalInformation	{ 2 9 3 2 7 6 }			
							C.4.3.5.2	additionalText	{ 2 9 3 2 7 7 }			
							C.4.3.5.3	attributeList	{ 2 9 3 2 7 9 }			
							C.4.3.5.4	correlatedNotifications	{ 2 9 3 2 7 12 }			
							C.4.3.5.5	notificationIdentifier	{ 2 9 3 2 7 16 }			
							C.4.3.5.6	sourceIndicator	{ 2 9 3 2 7 26 }			
C.4.3.5.3	"Rec. X.721 ISO/IEC 10165-2 : 1992": objectDeletion	{ 2 9 3 2 10 7 }	m				C.4.3.5.1	additionalInformation	{ 2 9 3 2 7 6 }			
							C.4.3.5.2	additionalText	{ 2 9 3 2 7 7 }			
							C.4.3.5.3	attributeList	{ 2 9 3 2 7 9 }			
							C.4.3.5.4	correlatedNotifications	{ 2 9 3 2 7 12 }			

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support	Add Info	Sub-Index	Notification Field Name Label	Value of OID of Attribute associated with Field	Status	Support	Additional Information
						C.4.3.5.3.1	notificationIdentifier	(2 9 3 2 7 0 16)			
						C.4.3.5.3.2	sourceIndicator	(2 9 3 2 7 0 26)			
C.4.3.5.4	"Rec. X.721 ISO/IEC 10165-2 : 1992": stateChange	(2 9 3 2 10 14)	m			C.4.3.5.4.1	additionalInformation	(2 9 3 2 7 0 6)			
						C.4.3.5.4.2	additionalText	(2 9 3 2 7 0 7)			
						C.4.3.5.4.3	attributeIdentifierList	(2 9 3 2 7 0 8)			
						C.4.3.5.4.4	correlatedNotifications	(2 9 3 2 7 0 12)			
						C.4.3.5.4.5	notificationIdentifier	(2 9 3 2 7 0 16)			
						C.4.3.5.4.6	sourceIndicator	(2 9 3 2 7 0 26)			
						C.4.3.5.4.7	stateChangeDefinition	(2 9 3 2 7 0 28)	m		
C.4.3.5.5	"Rec. X.721 ISO/IEC 10165-2 : 1992": processingError Alarm	(2 9 3 2 10 10)	m			C.4.3.5.5.1	additionalInformation	(2 9 3 2 7 0 6)			
						C.4.3.5.5.2	additionalText	(2 9 3 2 7 0 7)			
						C.4.3.5.5.3	backUpObject	(2 9 3 2 7 0 41)			
						C.4.3.5.5.4	backedUpStatus	(2 9 3 2 7 0 11)			
						C.4.3.5.5.5	correlatedNotifications	(2 9 3 2 7 0 12)			
						C.4.3.5.5.6	notificationIdentifier	(2 9 3 2 7 0 16)			
						C.4.3.5.5.7	perceivedSeverity	(2 9 3 2 7 0 17)	m		
						C.4.3.5.5.8	probableCause	(2 9 3 2 7 0 18)	m		
						C.4.3.5.5.9	proposedRepairActions	(2 9 3 2 7 0 19)			
						C.4.3.5.5.10	specificProblems	(2 9 3 2 7 0 27)			

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support	Add Info	Sub-Index	Notification Field Name Label	Value of OID of Attribute associated with Field	Status	Support	Additional Information
						C.4.3.5.5.11	stateChangeDefInitiation	(2 9 3 2 7 0 28)			
						C.4.3.5.5.12	thresholdInfo	(2 9 3 2 7 0 29)			
						C.4.3.5.5.13	trendIndication	(2 9 3 2 7 0 30)			
C.4.3.5.6	"Rec. X.721 ISO/IEC 10165-2 : 1992": communicationsAlarm	(2 9 3 2 10 2)	m			C.4.3.5.6.1	additionalInfo	(2 9 3 2 7 0 6)			
						C.4.3.5.6.2	additionalText	(2 9 3 2 7 0 7)			
						C.4.3.5.6.3	backUpObject	(2 9 3 2 7 0 41)			
						C.4.3.5.6.4	backedUpStatus	(2 9 3 2 7 0 11)			
						C.4.3.5.6.5	correlatedNotifications	(2 9 3 2 7 0 12)			
						C.4.3.5.6.6	notificationIdentifier	(2 9 3 2 7 0 16)			
						C.4.3.5.6.7	perceivedSeverity	(2 9 3 2 7 0 17)	m		
						C.4.3.5.6.8	probableCause	(2 9 3 2 7 0 18)	m		
						C.4.3.5.6.9	proposedRepairActions	(2 9 3 2 7 0 19)			
						C.4.3.5.6.10	specificProblems	(2 9 3 2 7 0 27)			
						C.4.3.5.6.11	stateChangeDefInitiation	(2 9 3 2 7 0 28)			
						C.4.3.5.6.12	thresholdInfo	(2 9 3 2 7 0 29)			
						C.4.3.5.6.13	trendIndication	(2 9 3 2 7 0 30)			

C.4.4 OMNIPoint Equipment MOCS Proforma

Managed Object class template label	Value of Object identifier for class
"OP1 Library Vol. 1":opEquipment	(1 3 14 2 2 1 4)

Are all mandatory features of the class supported? Yes _____
No _____

Table C.4.4.1 - Name Binding Support

Index	Name Binding Template Label	Value of Object Identifier for Name Binding	Superior Object Class Template Label	Status	Support	Status		Support		Additional Information
						create	delete	create	delete	
C.4.4.1.1	"Rec. M.3100 : 1992": equipment-equipment	{ 0 0 13 3100 0 6 10 }	"Rec. M.3100 : 1992":equipment	o		m	m			
C.4.4.1.2	"Rec. M.3100 : 1992": equipment-ManagedElement	{ 0 0 13 3100 0 6 9 }	"Rec. M.3100 : 1992": managedElement	o		m	m			
C.4.4.1.3	opEquipment-computerSystem	{ 1 3 14 2 2 3 10 }	computerSystem	o		m	m			
C.4.4.1.4	opEquipment-system	{ 1 3 14 2 2 3 11 }	"Rec. X.721 ISO/IEC 10165-2 : 1992":system	o		m	m			
C.4.4.1.5	opEquipment-equipment	{ 1 3 14 2 2 3 12 }	"Rec. M.3100 : 1992":equipment	o		m	m			
C.4.4.1.6	opEquipment-opNetwork	{ 1 3 14 2 2 3 13 }	opNetwork	o		m	m			

Table C.4.4.2 - Attribute Support

Index	Attribute Template Label	Value of Object Identifier for Attribute	Status					Support					Additional Information	
			affected by create	get	read replace	add	remove	set by default	set by create	get	read replace	add		remove
C.4.4.2.1	"Rec. M.3100 : 1992":affectedObjectList	{ 0 0 13 3100 0 7 2 }	x	c0	x	x	x	x						
C.4.4.2.2	"Rec. M.3100 : 1992":currentProblemList	{ 0 0 13 3100 0 7 17 }	x	c0	x	x	x	x						
C.4.4.2.3	"Rec. M.3100 : 1992":locationName	{ 0 0 13 3100 0 7 27 }		c0	c0	c0	x	x	x					
C.4.4.2.4	"Rec. M.3100 : 1992":replaceable	{ 0 0 13 3100 0 7 34 }	x	m	x	x	x	x						
C.4.4.2.5	"Rec. M.3100 : 1992":userLabel	{ 0 0 13 3100 0 7 50 }		c0	c0	c0	x	x	x					
C.4.4.2.6	"Rec. M.3100 : 1992":vendorName	{ 0 0 13 3100 0 7 51 }		c0	c0	c0	x	x	x					
C.4.4.2.7	"Rec. M.3100 : 1992":version	{ 0 0 13 3100 0 7 52 }		c14	c14	c14	x	x	x					
C.4.4.2.8	contactList	{ 1 3 14 2 2 4 7 }		c3	c3	c3	x	x	x					
C.4.4.2.9	contactName	{ 1 3 14 2 2 4 8 }		c4	c4	c4	c4	c4	x					
C.4.4.2.10	customerList	{ 1 3 14 2 2 4 11 }		c5	c5	c5	x	x	x					
C.4.4.2.11	customerName	{ 1 3 14 2 2 4 12 }		c6	c6	c6	c6	c6	x					
C.4.4.2.12	functionList	{ 1 3 14 2 2 4 14 }		c7	c7	c7	x	x	x					
C.4.4.2.13	functionName	{ 1 3 14 2 2 4 15 }		c8	c8	c8	c8	c8	x					
C.4.4.2.14	locationPointer	{ 1 3 14 2 2 4 22 }		c9	c9	c9	x	x	x					
C.4.4.2.15	manufacturerList	{ 1 3 14 2 2 4 23 }		c10	c10	c10	x	x	x					
C.4.4.2.16	manufacturerName	{ 1 3 14 2 2 4 24 }		c11	c11	c11	c11	c11	x					
C.4.4.2.17	opNetworkList	{ 1 3 14 2 2 4 34 }		c12	c12	c12	x	x	x					
C.4.4.2.18	opNetworkName	{ 1 3 14 2 2 4 35 }		c13	c13	c13	c13	c13	x					
C.4.4.2.19	productLabel	{ 1 3 14 2 2 4 45 }		c0	c0	c0	x	x	x					
C.4.4.2.20	serialNumber	{ 1 3 14 2 2 4 50 }		c0	c0	c0	x	x	x					
C.4.4.2.21	serviceList	{ 1 3 14 2 2 4 51 }		c15	c15	c15	x	x	x					
C.4.4.2.22	serviceName	{ 1 3 14 2 2 4 52 }		c16	c16	c16	c16	c16	x					
C.4.4.2.23	softwareList	{ 1 3 14 2 2 4 53 }		c17	c17	c17	x	x	x					

Index	Attribute Template Label	Value of Object Identifier for Attribute	Status					Support					Additional Information
			set by create	get	read by create	add	remove	set by create	get	read by create	add	remove	
C.4.4.2.24	softwareName	(1 3 14 2 2 4 54)	c18	c18	c18	c18	c18	x					
C.4.4.2.25	typeText	(1 3 14 2 2 4 59)	c0	c0	c0	x	x	x					
C.4.4.2.26	"Rec. X.721 ISO/IEC 10165-2 : 1992": usageState	(2 9 3 2 7 39)	x	c19	x	x	x	x					
C.4.4.2.27	vendorList	(1 3 14 2 2 4 61)	c20	c20	c20	c20	c20	x					
C.4.4.2.28	"Rec. X.721 ISO/IEC 10165-2 : 1992": operationalState	(2 9 3 2 7 35)	x	m	x	x	x	x					
C.4.4.2.29	"Rec. X.721 ISO/IEC 10165-2 : 1992": administrativeState	(2 9 3 2 7 31)	m	m	m	x	x	x					
C.4.4.2.30	"Rec. M.3100 : 1992": alarmStatus	(0 0 13 3100 0 7 6)	x	c	x	x	x	x					
C.4.4.2.31	"Rec. X.721 ISO/IEC 10165-2 : 1992": availabilityStatus	(2 9 3 2 7 33)	x	m	x	x	x	x					
C.4.4.2.32	"Rec. M.3100 : 1992": equipmentId	(0 0 13 3100 0 7 20)	m	m	x	x	x	x					
C.4.4.2.33	"Rec. X.721 ISO/IEC 10165-2 : 1992": allomorphs	(2 9 3 2 7 50)	c1	c1	x	x	x	x					
C.4.4.2.34	"Rec. X.721 ISO/IEC 10165-2 : 1992": nameBinding	(2 9 3 2 7 63)	m	m	x	x	x	x					
C.4.4.2.35	"Rec. X.721 ISO/IEC 10165-2 : 1992": objectClass	(2 9 3 2 7 65)	m	m	x	x	x	x					
C.4.4.2.36	"Rec. X.721 ISO/IEC 10165-2 : 1992": packages	(2 9 3 2 7 66)	c2	c2	x	x	x	x					


```

c0 = m if an instance supports it, else -
c1 = m if an object supports allomorphism, else -
c2 = m if any any registered package (other than this package) has been instantiated, else -
c3 = m if an instance supports it and the contactNamePkg is NOT present, else x
c4 = m if an instance supports it and the contactListPkg is NOT present, else x
c5 = m if an instance supports it and the customerNamePkg is NOT present, else x
c6 = m if an instance supports it and the customerListPkg is NOT present, else x
c7 = m if an instance supports it and the functionNamePkg is NOT present, else x
c8 = m if an instance supports it and the functionListPkg is NOT present, else x
c9 = m if an instance supports it and the "Rec. M.3100 : 1992":locationNamePackage is NOT present,
else x
c10= m if an instance supports it and the manufacturerNamePkg is NOT present, else x
c11= m if an instance supports it and the manufacturerListPkg is NOT present, else x
c12= m if an instance supports it and the opNetworkNamePkg is NOT present, else x
c13= m if an instance supports it and the opNetworkListPkg is NOT present, else x
c14= m if "Rec. M.3100 : 1992":versionPackage is also present and if an instance supports it, else -
c15= m if an instance supports it and the serviceNamePkg is NOT present, else x
c16= m if an instance supports it and the serviceListPkg is NOT present, else x
c17= m if an instance supports it and the softwareNamePkg is NOT present, else x
c18= m if an instance supports it and the softwareListPkg is NOT present, else x
c19= m if a resource can detect usage, else -
c20= m if an instance supports it and the "Rec. M.3100 : 1992":vendorNamePackage is NOT present,
else x

```

Table C.4.4.3 - Attribute Group Support

Index	Attribute Group Template Label	Value of Object Identifier for Attribute Group	Status	Support	Additional Information
			mandatory	optional	
C.4.4.3.1	"Rec. X.721 ISO/IEC 10165-2 1992":state	(2 9 3 2 8 1)	m	x	

Table C.4.4.5 - Notification Support

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support	Add Info	Sub-Index	Notification Field Name Label	Value of OID of Attribute associated with Field	Status	Support	Additional Information
C.4.4.5.1	"Rec. X.721 ISO/IEC 10165-2 : 1992": attributeValueChange	{ 2 9 3 2 10 1 }	M				C.4.4additionalInfo .5.1.1information	{ 2 9 3 2 7 6 }			
							C.4.4additionalText .5.1.2	{ 2 9 3 2 7 7 }			
							C.4.4attributeIdent .5.1.3ifierList	{ 2 9 3 2 7 8 }			
							C.4.4attributeValue .5.1.4ChangeDefinit ion	{ 2 9 3 2 7 10 }			
							C.4.4correlatedNoti .5.1.5fications	{ 2 9 3 2 7 12 }			
							C.4.4notificationid .5.1.6entifier	{ 2 9 3 2 7 16 }			
							C.4.4sourceIndicato .5.1.7r	{ 2 9 3 2 7 26 }			
C.4.4.5.2	"Rec. X.721 ISO/IEC 10165-2 : 1992": objectCreation	{ 2 9 3 2 10 6 }	M				C.4.4additionalInfo .5.2.1rmation	{ 2 9 3 2 7 6 }			
							C.4.4additionalText .5.2.2	{ 2 9 3 2 7 7 }			
							C.4.4attributeList .5.2.3	{ 2 9 3 2 7 9 }			
							C.4.4correlatedNoti .5.2.4fications	{ 2 9 3 2 7 12 }			
							C.4.4notificationid .5.2.5entifier	{ 2 9 3 2 7 16 }			
							C.4.4sourceIndicato .5.2.6r	{ 2 9 3 2 7 26 }			
C.4.4.5.3	"Rec. X.721 ISO/IEC 10165-2 : 1992": objectDeletion	{ 2 9 3 2 10 7 }	M				C.4.4additionalInfo .5.3.1rmation	{ 2 9 3 2 7 6 }			
							C.4.4additionalText .5.3.2	{ 2 9 3 2 7 7 }			
							C.4.4attributeList .5.3.3	{ 2 9 3 2 7 9 }			
							C.4.4correlatedNoti .5.3.4fications	{ 2 9 3 2 7 12 }			
							C.4.4notificationid .5.3.5entifier	{ 2 9 3 2 7 16 }			

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support	Add Info	Sub-Index	Notification Field Name Label	Value of DID of Attribute associated with Field	Status	Support	Additional Information
						C.4.4.5.3.6	sourceIndicator	(2 9 3 2 7 6)			
C.4.4.5.4	"Rec. X.721 ISO/IEC 10165-2 : 1992": stateChange	(2 9 3 2 10 14)	m			C.4.4.5.4.1	additionalInformation	(2 9 3 2 7 6)			
						C.4.4.5.4.2	additionalText	(2 9 3 2 7 7)			
						C.4.4.5.4.3	attributeIdentifierList	(2 9 3 2 7 8)			
						C.4.4.5.4.4	correlatedNotifications	(2 9 3 2 7 12)			
						C.4.4.5.4.5	notificationIdentifier	(2 9 3 2 7 16)			
						C.4.4.5.4.6	sourceIndicator	(2 9 3 2 7 26)			
						C.4.4.5.4.7	stateChangeDefinition	(2 9 3 2 7 28)	m		
C.4.4.5.5	"Rec. X.721 ISO/IEC 10165-2 : 1992": communicationsAlarm	(2 9 3 2 10 2)	m			C.4.4.5.5.1	additionalInformation	(2 9 3 2 7 6)			
						C.4.4.5.5.2	additionalText	(2 9 3 2 7 7)			
						C.4.4.5.5.3	backUpObject	(2 9 3 2 7 41)			
						C.4.4.5.5.4	backedUpStatus	(2 9 3 2 7 11)			
						C.4.4.5.5.5	correlatedNotifications	(2 9 3 2 7 12)			
						C.4.4.5.5.6	notificationIdentifier	(2 9 3 2 7 16)			
						C.4.4.5.5.7	perceivedSeverity	(2 9 3 2 7 17)	m		
						C.4.4.5.5.8	probableCause	(2 9 3 2 7 18)	m		
						C.4.4.5.5.9	proposedRepairActions	(2 9 3 2 7 19)			
						C.4.4.5.5.10	specificProblems	(2 9 3 2 7 27)			
						C.4.4.5.5.11	stateChangeDefinition	(2 9 3 2 7 28)			

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support	Add Info	Sub-Index	Notification Field Name Label	Value of OID of Attribute associated with Field	Status	Support	Additional Information
						C.4.4.5.5.1	thresholdInfo	(2 9 3 2 7 0 29)			
						C.4.4.5.5.13	trendIndication	(2 9 3 2 7 0 30)			
C.4.4.5.6	"Rec. X.721 ISO/IEC 10165-2 : 1992": processingErrorAlarm	(2 9 3 2 10 10)	m			C.4.4.5.5.1	additionalInformation	(2 9 3 2 7 0 6)			
						C.4.4.5.5.2	additionalText	(2 9 3 2 7 0 7)			
						C.4.4.5.5.3	backUpObject	(2 9 3 2 7 0 41)			
						C.4.4.5.5.4	backedUpStatus	(2 9 3 2 7 0 11)			
						C.4.4.5.5.5	correlatedNotifications	(2 9 3 2 7 0 12)			
						C.4.4.5.5.6	notificationIdentifier	(2 9 3 2 7 0 16)			
						C.4.4.5.5.7	perceivedSeverity	(2 9 3 2 7 0 17)	m		
						C.4.4.5.5.8	probableCause	(2 9 3 2 7 0 18)	m		
						C.4.4.5.5.9	proposedRepairActions	(2 9 3 2 7 0 19)			
						C.4.4.5.5.10	specificProblems	(2 9 3 2 7 0 27)			
						C.4.4.5.5.11	stateChangeDefinition	(2 9 3 2 7 0 28)			
						C.4.4.5.5.12	thresholdInfo	(2 9 3 2 7 0 29)			
						C.4.4.5.5.13	trendIndication	(2 9 3 2 7 0 30)			
C.4.4.5.7	"Rec. X.721 ISO/IEC 10165-2 : 1992": environmentalAlarm	(2 9 3 2 10 3)	m			C.4.4.5.6.1	additionalInformation	(2 9 3 2 7 0 6)			
						C.4.4.5.6.2	additionalText	(2 9 3 2 7 0 7)			
						C.4.4.5.6.3	backUpObject	(2 9 3 2 7 0 41)			
						C.4.4.5.6.4	backedUpStatus	(2 9 3 2 7 0 11)			

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support	Add Info	Sub-Index	Notification Field Name Label	Value of OID of Attribute associated with Field	Status	Support	Additional Information
						5	C.4.4.correlatedNotifications	(2 9 3 2 7 12)			
						6	C.4.4.notificationIdentifier	(2 9 3 2 7 16)			
						7	C.4.4.perceivedSeverity	(2 9 3 2 7 17)			
						8	C.4.4.probableCause	(2 9 3 2 7 18)			
						9	C.4.4.proposedRepairActions	(2 9 3 2 7 19)			
						10	C.4.4.specificProblems	(2 9 3 2 7 27)			
						11	C.4.4.stateChangeDefinition	(2 9 3 2 7 28)			
						12	C.4.4.thresholdInfo	(2 9 3 2 7 29)			
						13	C.4.4.trendIndication	(2 9 3 2 7 30)			
C.4.4.5.B	"Rec. X.721 ISO/IEC 10165-2 : 1992": equipmentAlarm	(2 9 3 2 10 4)	m			1	C.4.4.additionalInfo	(2 9 3 2 7 6)			
						2	C.4.4.additionalText	(2 9 3 2 7 7)			
						3	C.4.4.backUpObject	(2 9 3 2 7 41)			
						4	C.4.4.backedUpStatus	(2 9 3 2 7 11)			
						5	C.4.4.correlatedNotifications	(2 9 3 2 7 12)			
						6	C.4.4.notificationIdentifier	(2 9 3 2 7 16)			
						7	C.4.4.perceivedSeverity	(2 9 3 2 7 17)			
						8	C.4.4.probableCause	(2 9 3 2 7 18)			
						9	C.4.4.proposedRepairActions	(2 9 3 2 7 19)			
						10	C.4.4.specificProblems	(2 9 3 2 7 27)			

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support		Additional Info	Sub-Index	Notification Field Name Label	Value of DID of Attribute associated with Field	Status	Support		Additional Information
				Core	Optional						Core	Optional	
							C.4.4.5.7.11	stateChangeDefinition	(2 9 3 2 7 0 28)				
							C.4.4.5.7.12	thresholdInfo	(2 9 3 2 7 0 29)				
							C.4.4.5.7.13	trendIndication	(2 9 3 2 7 0 30)				

C.4.5 OMNIPoint Network MOCS Proforma

Managed Object class template label	Value of Object identifier for class
"OP1 Library Vol. 1":opNetwork	(1 3 14 2 2 1 5)

Are all mandatory features of the class supported? Yes _____
No _____

Table C.4.5.1 - Name Binding Support

Index	Name Binding Template Label	Value of Object Identifier for Name Binding	Superior Object Class Template Label	Status	Support	Status		Support		Additional Information
						Core	Optional	Core	Optional	
C.4.5.1.1	"Rec. M.3100 : 1992": network-network	(0 0 13 3100 0 6 17)	"Rec. M.3100 : 1992": network	o		x	x			
C.4.5.1.2	network-opNetwork-1	(1 3 14 2 2 3 14)	"Rec. M.3100 : 1992": network	o		m	m			
C.4.5.1.3	network-opNetwork-2	(1 3 14 2 2 3 15)	"Rec. M.3100 : 1992": network	o		m	m			
C.4.5.1.4	opNetwork-root	(1 3 14 2 2 3 16)	"Rec. X.600 ISO/IEC 9834-1 : 1992":root	o		m	m			

Table C.4.5.2 - Attribute Support

Index	Attribute Template Label	Value of Object Identifier for Attribute	Status						Support						Additional Information
			is a subclass of	is a subclass of	is a subclass of	is a subclass of	is a subclass of	is a subclass of	is a subclass of	is a subclass of	is a subclass of	is a subclass of	is a subclass of	is a subclass of	
C.4.5.2.1	"Rec. M.3100 : 1992":networkId	{ 0 0 13 3100 0 7 3 }	m	m	x	x	x	x							
C.4.5.2.2	"Rec. M.3100 : 1992":userLabel	{ 0 0 13 3100 0 7 50 }	c0	c0	c0	x	x	x							
C.4.5.2.3	networkTitle	{ 1 3 14 2 2 4 31 }	m	m	x	x	x	x							
C.4.5.2.4	"Rec. X.721 ISO/IEC 10165-2 : 1992":allomorphs	{ 2 9 3 2 7 50 }	c1	c1	x	x	x	x							
C.4.5.2.5	"Rec. X.721 ISO/IEC 10165-2 : 1992":nameBinding	{ 2 9 3 2 7 63 }	m	m	x	x	x	x							
C.4.5.2.6	"Rec. X.721 ISO/IEC 10165-2 : 1992":objectClass	{ 2 9 3 2 7 65 }	m	m	x	x	x	x							
C.4.5.2.7	"Rec. X.721 ISO/IEC 10165-2 : 1992":packages	{ 2 9 3 2 7 66 }	c2	c2	x	x	x	x							

c0 = m if an instance supports it, else -

c1 = m if an object supports allomorphism, else -

c2 = m if any any registered package (other than this package) has been instantiated, else -

Table C.4.5.5 - Notification Support

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support	Add Info	Sub-Index	Notification Field Name Label	Value of OID of Attribute associated with Field	Status	Support	Additional Information
C.4.5.5.1	"Rec. X.721 ISO/IEC 10165-2 : 1992": attributeValueChange	{ 2 9 3 2 10 1 }	m			C.4.5.1	additionalInfo	{ 2 9 3 2 7 6 }			
						C.4.5.2	additionalText	{ 2 9 3 2 7 7 }			
						C.4.5.3	attributeIdentifierList	{ 2 9 3 2 7 8 }			
						C.4.5.4	attributeValueChangeDefinition	{ 2 9 3 2 7 10 }			
						C.4.5.5	correlatedNotifications	{ 2 9 3 2 7 12 }			
						C.4.5.6	notificationIdentifier	{ 2 9 3 2 7 16 }			
						C.4.5.7	sourceIndicator	{ 2 9 3 2 7 26 }			
C.4.5.5.2	"Rec. X.721 ISO/IEC 10165-2 : 1992": objectCreation	{ 2 9 3 2 10 6 }	m			C.4.5.1	additionalInfo	{ 2 9 3 2 7 6 }			
						C.4.5.2	additionalText	{ 2 9 3 2 7 7 }			
						C.4.5.3	attributeList	{ 2 9 3 2 7 9 }			
						C.4.5.4	correlatedNotifications	{ 2 9 3 2 7 12 }			
						C.4.5.5	notificationIdentifier	{ 2 9 3 2 7 16 }			
						C.4.5.6	sourceIndicator	{ 2 9 3 2 7 26 }			
C.4.5.5.3	"Rec. X.721 ISO/IEC 10165-2 : 1992": objectDeletion	{ 2 9 3 2 10 7 }	m			C.4.5.1	additionalInfo	{ 2 9 3 2 7 6 }			
						C.4.5.2	additionalText	{ 2 9 3 2 7 7 }			
						C.4.5.3	attributeList	{ 2 9 3 2 7 9 }			
						C.4.5.4	correlatedNotifications	{ 2 9 3 2 7 12 }			
						C.4.5.5	notificationIdentifier	{ 2 9 3 2 7 16 }			

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support	Add Info	Sub-Index	Notification Field Name Label	Value of OID of Attribute associated with Field	Status	Support	Additional Information
						C.4.5.5.3.6	sourceIndicator	{ 2 9 3 2 7 6 26 }			

C.4.6 Processing Entity MOCS Proforma

Managed Object class template label	Value of Object Identifier for class
"OP1 Library Vol. 1":processingEntity	{ 1 3 14 2 2 1 6 }

Are all mandatory features of the class supported? Yes _____
 No _____

Table C.4.6.1 - Name Binding Support

Index	Name Binding Template Label	Value of Object Identifier for Name Binding	Superior Object Class Template Label	Status	Support	Status				Support	Additional Information
						create	delete	modify	rename		
C.4.6.1.1	"Rec. M.3100 : 1992":equipment-equipment	{ 0 0 13 3100 0 6 10 }	"Rec. M.3100 : 1992":equipment	o		m	m				
C.4.6.1.2	"Rec. M.3100 : 1992":equipment-ManagedElement	{ 0 0 13 3100 0 6 9 }	"Rec. M.3100 : 1992":managedElement	o		m	m				
C.4.6.1.3	opEquipment-computerSystem	{ 1 3 14 2 2 3 10 }	computerSystem	o		m	m				
C.4.6.1.4	opEquipment-system	{ 1 3 14 2 2 3 11 }	"Rec. X.721 ISO/IEC 10165-2 : 1992":system	o		m	m				
C.4.6.1.5	opEquipment-equipment	{ 1 3 14 2 2 3 12 }	"Rec. M.3100 : 1992":equipment	o		m	m				
C.4.6.1.6	opEquipment-opNetwork	{ 1 3 14 2 2 3 13 }	opNetwork	o		m	m				

Table C.4.6.2 - Attribute Support

Index	Attribute Template Label	Value of Object Identifier for Attribute	Status					Support					Additional Information		
			set by create	get	replace	add	remove	set by default	set by create	get	replace	add		remove	set by default
C.4.6.2.1	"Rec. M.3100 : 1992":affectedObjectList	{ 0 0 13 3100 0 7 2 }	x	c0	x	x	x	x							
C.4.6.2.2	"Rec. M.3100 : 1992":currentProblemList	{ 0 0 13 3100 0 7 17 }	x	c0	x	x	x	x							
C.4.6.2.3	"Rec. M.3100 : 1992":locationName	{ 0 0 13 3100 0 7 27 }	c0	c0	c0	x	x	x							
C.4.6.2.4	"Rec. M.3100 : 1992":replaceable	{ 0 0 13 3100 0 7 34 }	x	m	x	x	x	x							
C.4.6.2.5	"Rec. M.3100 : 1992":userLabel	{ 0 0 13 3100 0 7 50 }	c0	c0	c0	x	x	x							
C.4.6.2.6	"Rec. M.3100 : 1992":vendorName	{ 0 0 13 3100 0 7 51 }	c0	c0	c0	x	x	x							
C.4.6.2.7	"Rec. M.3100 : 1992":version	{ 0 0 13 3100 0 7 52 }	c14	c14	c14	x	x	x							
C.4.6.2.8	contactList	{ 1 3 14 2 2 4 7 }	c3	c3	c3	x	x	x							
C.4.6.2.9	contactName	{ 1 3 14 2 2 4 8 }	c4	c4	c4	c4	c4	x							
C.4.6.2.10	customerList	{ 1 3 14 2 2 4 11 }	c5	c5	c5	x	x	x							
C.4.6.2.11	customerName	{ 1 3 14 2 2 4 12 }	c6	c6	c6	c6	c6	x							
C.4.6.2.12	functionList	{ 1 3 14 2 2 4 14 }	c7	c7	c7	x	x	x							
C.4.6.2.13	functionName	{ 1 3 14 2 2 4 15 }	c8	c8	c8	c8	c8	x							
C.4.6.2.14	locationPointer	{ 1 3 14 2 2 4 22 }	c9	c9	c9	x	x	x							
C.4.6.2.15	manufacturerList	{ 1 3 14 2 2 4 23 }	c10	c10	c10	x	x	x							
C.4.6.2.16	manufacturerName	{ 1 3 14 2 2 4 24 }	c11	c11	c11	c11	c11	x							
C.4.6.2.17	opNetworkList	{ 1 3 14 2 2 4 34 }	c12	c12	c12	x	x	x							
C.4.6.2.18	opNetworkName	{ 1 3 14 2 2 4 35 }	c13	c13	c13	c13	c13	x							
C.4.6.2.19	productLabel	{ 1 3 14 2 2 4 45 }	c0	c0	c0	x	x	x							
C.4.6.2.20	serialNumber	{ 1 3 14 2 2 4 50 }	c0	c0	c0	x	x	x							
C.4.6.2.21	serviceList	{ 1 3 14 2 2 4 51 }	c15	c15	c15	x	x	x							
C.4.6.2.22	serviceName	{ 1 3 14 2 2 4 52 }	c16	c16	c16	c16	c16	x							
C.4.6.2.23	softwareList	{ 1 3 14 2 2 4 53 }	c17	c17	c17	x	x	x							

Index	Attribute Template Label	Value of Object Identifier for Attribute	Status						Support						Additional Information
			set by create	set	replace	add	remove	set to default	set by create	get	replace	add	remove	set to default	
C.4.6.2.24	softwareName	(1 3 14 2 2 4 54)	c18	c18	c18	c18	c18	x							
C.4.6.2.25	typeText	(1 3 14 2 2 4 59)	c0	c0	c0	x	x	x							
C.4.6.2.26	"Rec. X.721 ISO/IEC 10165-2 : 1992": usageState	(2 9 3 2 7 39)	x	c19	x	x	x	x							
C.4.6.2.27	vendorList	(1 3 14 2 2 4 61)	c20	c20	c20	c20	c20	x							
C.4.6.2.28	"Rec. X.721 ISO/IEC 10165-2 : 1992": operationalState	(2 9 3 2 7 35)	x	m	x	x	x	x							
C.4.6.2.29	"Rec. X.721 ISO/IEC 10165-2 : 1992": administrativeState	(2 9 3 2 7 31)	m	m	m	x	x	x							
C.4.6.2.30	"Rec. N.3100 : 1992": alarmStatus	(0 0 13 3100 0 7 6)	x	c	x	x	x	x							
C.4.6.2.31	"Rec. X.721 ISO/IEC 10165-2 : 1992": availabilityStatus	(2 9 3 2 7 33)	x	m	x	x	x	x							
C.4.6.2.32	"Rec. N.3100 : 1992": equipmentId	(0 0 13 3100 0 7 20)	m	m	x	x	x	x							
C.4.6.2.33	"Rec. X.721 ISO/IEC 10165-2 : 1992": allomorphs	(2 9 3 2 7 50)	c1	c1	x	x	x	x							
C.4.6.2.34	"Rec. X.721 ISO/IEC 10165-2 : 1992": nameBinding	(2 9 3 2 7 63)	m	m	x	x	x	x							
C.4.6.2.35	"Rec. X.721 ISO/IEC 10165-2 : 1992": objectClass	(2 9 3 2 7 65)	m	m	x	x	x	x							
C.4.6.2.36	"Rec. X.721 ISO/IEC 10165-2 : 1992": packages	(2 9 3 2 7 66)	c2	c2	x	x	x	x							
C.4.6.2.37	addressingSize	(1 3 14 2 2 4 2)	x	c21	x	x	x	x							
C.4.6.2.38	endianess	(1 3 14 2 2 4 13)	x	c21	x	x	x	x							
C.4.6.2.39	cpuUtilization	(1 3 14 2 2 4 10)	x	c0	x	x	x	x							
C.4.6.2.40	memorySize	(1 3 14 2 2 4 28)	x	c21	x	x	x	x							
C.4.6.2.41	memoryUtilization	(1 3 14 2 2 4 29)	x	c0	x	x	x	x							
C.4.6.2.42	upTime	(1 3 14 2 2 4 60)	x	c0	x	x	x	x							
C.4.6.2.43	cpuType	(1 3 14 2 2 4 9)	x	m	x	x	x	x							
C.4.6.2.44	osInfo	(1 3 14 2 2 4 36)	x	m	x	x	x	x							


```
c0 = m if an instance supports it, else -
c1 = m if an object supports allomorphism, else -
c2 = m if any any registered package (other than this package) has been instantiated, else -
c3 = m if an instance supports it and the contactNamePkg is NOT present, else x
c4 = m if an instance supports it and the contactListPkg is NOT present, else x
c5 = m if an instance supports it and the customerNamePkg is NOT present, else x
c6 = m if an instance supports it and the customerListPkg is NOT present, else x
c7 = m if an instance supports it and the functionNamePkg is NOT present, else x
c8 = m if an instance supports it and the functionListPkg is NOT present, else x
c9 = m if an instance supports it and the "Rec. M.3100 : 1992":locationNamePackage is NOT present,
else x
c10= m if an instance supports it and the manufacturerNamePkg is NOT present, else x
c11= m if an instance supports it and the manufacturerListPkg is NOT present, else x
c12= m if an instance supports it and the opNetworkNamePkg is NOT present, else x
c13= m if an instance supports it and the opNetworkListPkg is NOT present, else x
c14= m if "Rec. M.3100 : 1992":versionPackage is also present and if an instance supports it, else -
c15= m if an instance supports it and the serviceNamePkg is NOT present, else x
c16= m if an instance supports it and the serviceListPkg is NOT present, else x
c17= m if an instance supports it and the softwareNamePkg is NOT present, else x
c18= m if an instance supports it and the softwareListPkg is NOT present, else x
c19= m if a resource can detect usage, else -
c20= m if an instance supports it and the "Rec. M.3100 : 1992":vendorNamePackage is NOT present,
else x
c21= m if relevant to the underlying resource, else -
```

Table C.4.6.3 - Attribute Group Support

Index	Attribute Group Template Label	Value of Object Identifier for Attribute Group	Status		Support		Additional Information
			get	set	get	set	
			t	t	t	t	
			o	d	o	d	
			e	e	e	e	
			f	f	f	f	
			a	a	a	a	
			u	u	u	u	
			l	l	l	l	
			t	t	t	t	
C.4.6.3.1	"Rec. X.721 ISO/IEC 10165-2 : 1992":state	(2 9 3 2 8 1)	m	x			

Table C.4.6.5 - Notification Support

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support		Add Info	Sub-Index	Notification Field Name Label	Value of OID of Attribute associated with Field	Status	Support	Additional Information
				Notification	Notification							
C.4.6.5.1	"Rec. X.721 ISO/IEC 10165-2 : 1992": attributeValueChange	(2 9 3 2 10 1)	M					C.4.6additionalInfo (2 9 3 2 7 6)				
								.5.1.formation				
								1				
								C.4.6additionalText (2 9 3 2 7 7)				
								.5.1.				
								2				
								C.4.6attributeIdent (2 9 3 2 7 8)				
C.4.6.5.2	"Rec. X.721 ISO/IEC 10165-2 : 1992": objectCreation	(2 9 3 2 10 6)	M					.5.1.ifierList				
								3				
								C.4.6attributeValue (2 9 3 2 7 10)				
								.5.1. ChangeDefiniti on				
								4				
								C.4.6correlatedNoti (2 9 3 2 7 12)				
								.5.1. fications				
C.4.6.5.3	"Rec. X.721 ISO/IEC 10165-2 : 1992": objectDeletion	(2 9 3 2 10 7)	M					5				
								C.4.6notificationId (2 9 3 2 7 16)				
								.5.1. entifier				
								6				
								C.4.6sourceIndicato (2 9 3 2 7 26)				
								.5.1. r				
								7				
C.4.6.5.2	"Rec. X.721 ISO/IEC 10165-2 : 1992": objectCreation	(2 9 3 2 10 6)	M					C.4.6additionalInfo (2 9 3 2 7 6)				
								.5.2. formation				
								1				
								C.4.6additionalText (2 9 3 2 7 7)				
								.5.2.				
								2				
								C.4.6attributeList (2 9 3 2 7 9)				
C.4.6.5.3	"Rec. X.721 ISO/IEC 10165-2 : 1992": objectDeletion	(2 9 3 2 10 7)	M					.5.2.				
								3				
								C.4.6correlatedNoti (2 9 3 2 7 12)				
								.5.2. fications				
								4				
								C.4.6notificationId (2 9 3 2 7 16)				
								.5.2. entifier				
C.4.6.5.3	"Rec. X.721 ISO/IEC 10165-2 : 1992": objectDeletion	(2 9 3 2 10 7)	M					5				
								C.4.6sourceIndicato (2 9 3 2 7 26)				
								.5.2. r				
								6				
								C.4.6additionalInfo (2 9 3 2 7 6)				
								.5.3. formation				
								1				
C.4.6.5.3	"Rec. X.721 ISO/IEC 10165-2 : 1992": objectDeletion	(2 9 3 2 10 7)	M					C.4.6additionalText (2 9 3 2 7 7)				
								.5.3.				
								2				
								C.4.6attributeList (2 9 3 2 7 9)				
								.5.3.				
								3				
								C.4.6correlatedNoti (2 9 3 2 7 12)				
C.4.6.5.3	"Rec. X.721 ISO/IEC 10165-2 : 1992": objectDeletion	(2 9 3 2 10 7)	M					.5.3. fications				
								4				
								C.4.6notificationId (2 9 3 2 7 16)				
								.5.3. entifier				
								5				
								C.4.6sourceIndicato (2 9 3 2 7 26)				
								.5.3. r				

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support	Add Info	Sub-Index	Notification Field Name Label	Value of OID of Attribute associated with Field	Status	Support	Additional Information
							C.4.6.sourceIndicato .5.3.r 6	{ 2 9 3 2 7 o 26 }			
C.4.6.5.4	"Rec. X.721 ISO/IEC 10165- 2 : 1992": stateChange	{ 2 9 3 2 10 14 }	m				C.4.6.additionalInfo .5.4.r 1	{ 2 9 3 2 7 o 6 }			
							C.4.6.additionalText .5.4. 2	{ 2 9 3 2 7 o 7 }			
							C.4.6.attributeIdent .5.4.ifierList 3	{ 2 9 3 2 7 o 8 }			
							C.4.6.correlatedNoti .5.4.fications 6	{ 2 9 3 2 7 o 12 }			
							C.4.6.notificationId .5.4.entifier 5	{ 2 9 3 2 7 o 16 }			
							C.4.6.sourceIndicato .5.4.r 6	{ 2 9 3 2 7 o 26 }			
							C.4.6.stateChangeDef .5.4.inition 7	{ 2 9 3 2 7 m 28 }			
C.4.6.5.5	"Rec. X.721 ISO/IEC 10165- 2 : 1992": communications Alarm	{ 2 9 3 2 10 2 }	m				C.4.6.additionalInfo .5.5.r 1	{ 2 9 3 2 7 o 6 }			
							C.4.6.additionalText .5.5. 2	{ 2 9 3 2 7 o 7 }			
							C.4.6.backUpObject .5.5. 3	{ 2 9 3 2 7 o 41 }			
							C.4.6.backedUpStatus .5.5. 4	{ 2 9 3 2 7 o 11 }			
							C.4.6.correlatedNoti .5.5.fications 5	{ 2 9 3 2 7 o 12 }			
							C.4.6.notificationId .5.5.entifier 6	{ 2 9 3 2 7 o 16 }			
							C.4.6.perceivedSever .5.5.ity 7	{ 2 9 3 2 7 m 17 }			
							C.4.6.probableCause .5.5. 8	{ 2 9 3 2 7 m 18 }			
							C.4.6.proposedRepair .5.5.Actions 9	{ 2 9 3 2 7 o 19 }			
							C.4.6.specificProble .5.5.ms 10	{ 2 9 3 2 7 o 27 }			
							C.4.6.stateChangeDef .5.5.inition 11	{ 2 9 3 2 7 o 28 }			

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support	Add Info	Sub-Index	Notification Field Name Label	Value of OID of Attribute associated with Field	Status	Support	Additional Information
						C.4.6.5.5.12	thresholdInfo	(2 9 3 2 7 0 29)			
						C.4.6.5.5.13	trendIndication	(2 9 3 2 7 0 30)			
C.4.6.5.6	"Rec. X.721 ISO/IEC 10165-2 : 1992": processingErrorAlarm	(2 9 3 2 10 10)	m			C.4.6.5.5.1	additionalInformation	(2 9 3 2 7 0 6)			
						C.4.6.5.5.2	additionalText	(2 9 3 2 7 0 7)			
						C.4.6.5.5.3	backUpObject	(2 9 3 2 7 0 41)			
						C.4.6.5.5.4	backedUpStatus	(2 9 3 2 7 0 11)			
						C.4.6.5.5.5	correlatedNotifications	(2 9 3 2 7 0 12)			
						C.4.6.5.5.6	notificationIdentifier	(2 9 3 2 7 0 16)			
						C.4.6.5.5.7	perceivedSeverity	(2 9 3 2 7 0 17)			
						C.4.6.5.5.8	probableCause	(2 9 3 2 7 0 18)			
						C.4.6.5.5.9	proposedRepairActions	(2 9 3 2 7 0 19)			
						C.4.6.5.5.10	specificProblems	(2 9 3 2 7 0 27)			
						C.4.6.5.5.11	stateChangeDefinition	(2 9 3 2 7 0 28)			
						C.4.6.5.5.12	thresholdInfo	(2 9 3 2 7 0 29)			
						C.4.6.5.5.13	trendIndication	(2 9 3 2 7 0 30)			
C.4.6.5.7	"Rec. X.721 ISO/IEC 10165-2 : 1992": environmentalAlarm	(2 9 3 2 10 3)	m			C.4.6.5.6.1	additionalInformation	(2 9 3 2 7 0 6)			
						C.4.6.5.6.2	additionalText	(2 9 3 2 7 0 7)			
						C.4.6.5.6.3	backUpObject	(2 9 3 2 7 0 41)			
						C.4.6.5.6.4	backedUpStatus	(2 9 3 2 7 0 11)			

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support	Add Info	Sub-Index	Notification Field Name Label	Value of DID of Attribute associated with Field	Status	Support	Additional Information
						5	C.4.6correlatedNoti .5.6.fications	(2 9 3 2 7 o 12)			
						6	C.4.6notificationid .5.6.entifier	(2 9 3 2 7 o 16)			
						7	C.4.6perceivedSever .5.6.ity	(2 9 3 2 7 m 17)			
						8	C.4.6probableCause .5.6.	(2 9 3 2 7 m 18)			
						9	C.4.6proposedRepair .5.6.Actions	(2 9 3 2 7 o 19)			
						10	C.4.6specificProble .5.6.ms	(2 9 3 2 7 o 27)			
						11	C.4.6stateChangeDef .5.6.inition	(2 9 3 2 7 o 28)			
						12	C.4.6thresholdInfo .5.6.	(2 9 3 2 7 o 29)			
						13	C.4.6trendIndicatio .5.6.n	(2 9 3 2 7 o 30)			
C.4.6.5.B	"Rec. X.721 ISO/IEC 10165- 2 : 1992": equipmentAlarm	(2 9 3 2 10 4)	m			1	C.4.6additionalInfo .5.7.formation	(2 9 3 2 7 o 6)			
						2	C.4.6additionalText .5.7.	(2 9 3 2 7 o 7)			
						3	C.4.6backUpObject .5.7.	(2 9 3 2 7 o 41)			
						4	C.4.6backedUpStatus .5.7.	(2 9 3 2 7 o 11)			
						5	C.4.6correlatedNoti .5.7.fications	(2 9 3 2 7 o 12)			
						6	C.4.6notificationid .5.7.entifier	(2 9 3 2 7 o 16)			
						7	C.4.6perceivedSever .5.7.ity	(2 9 3 2 7 m 17)			
						8	C.4.6probableCause .5.7.	(2 9 3 2 7 m 18)			
						9	C.4.6proposedRepair .5.7.Actions	(2 9 3 2 7 o 19)			
						10	C.4.6specificProble .5.7.ms	(2 9 3 2 7 o 27)			

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support	Add Info	Sub-Index	Notification Field Name Label	Value of OID of Attribute associated with Field	Status	Support	Additional Information
						C.4.6.11	stateChangeDefInitiation	{ 2 9 3 2 7 28 }			
						C.4.6.12	thresholdInfo	{ 2 9 3 2 7 29 }			
						C.4.6.13	trendIndication	{ 2 9 3 2 7 30 }			

C.4.7 Transport Connection MOCS Proforma

Managed Object class template label	Value of Object Identifier for class
"DPI Library Vol. 1":transportConnection	{ 1 3 14 2 2 1 7 }

Are all mandatory features of the class supported? Yes _____
 No _____

Table C.4.7.1 - Name Binding Support

Index	Name Binding Template Label	Value of Object Identifier for Name Binding	Superior Object Class Template Label	Status	Support	Status				Support	Additional Information
						create	delete	modify	rename		
C.4.7.1.1	transportConnection-coTransportProtocolLayerEntity	{ 1 3 14 2 2 3 17 }	coTransportProtocolLayerEntity	o		x	m				

Table C.4.7.2 - Attribute Support

Index	Attribute Template Label	Value of Object Identifier for Attribute	Status					Support					Additional Information	
			set by create	get	replace	add	remove	set by default	get	replace	add	remove		set to default
C.4.7.2.1	maxRetransmissions	{ 1 3 14 2 2 4 27 }	x	c0	x	x	x	x						
C.4.7.2.2	retransmissionTime	{ 1 3 14 2 2 4 48 }	x	c0	x	x	x	x						
C.4.7.2.3	retransmissionTimerInitialValue	{ 1 3 14 2 2 4 49 }	x	c0	x	x	x	x						
C.4.7.2.4	"Rec. X.721 ISO/IEC 10165-2 : 1992": pduRetransmittedErrorCounter	{ 2 9 3 2 7 87 }	x	c0	x	x	x	x						
C.4.7.2.5	"Rec. X.721 ISO/IEC 10165-2 : 1992": octetsRetransmittedErrorCounter	{ 2 9 3 2 7 79 }	x	c0	x	x	x	x						
C.4.7.2.6	"Rec. X.721 ISO/IEC 10165-2 : 1992": pduRetransmittedErrorThreshold	{ 2 9 3 2 7 102 }	x	c0	c0	x	x	x						
C.4.7.2.7	"Rec. X.721 ISO/IEC 10165-2 : 1992": outgoingProtocolErrorCounter	{ 2 9 3 2 7 85 }	x	c0	x	x	x	x						
C.4.7.2.8	checksumPDUsDiscardedCounter	{ 1 3 14 2 2 4 3 }	x	c0	x	x	x	x						
C.4.7.2.9	localTransportConnectionEndpoint	{ 1 3 14 2 2 4 21 }	x	m	x	x	x	x						
C.4.7.2.10	remoteTransportConnectionEndpoint	{ 1 3 14 2 2 4 47 }	x	m	x	x	x	x						
C.4.7.2.11	transportConnectionReference	{ 1 3 14 2 2 4 57 }	x	m	x	x	x	x						
C.4.7.2.12	localNetworkAddress	{ 1 3 14 2 2 4 18 }	x	m	x	x	x	x						
C.4.7.2.13	remoteNetworkAddress	{ 1 3 14 2 2 4 46 }	x	m	x	x	x	x						
C.4.7.2.14	inactivityTimeout	{ 1 3 14 2 2 4 17 }	x	m	x	x	x	x						
C.4.7.2.15	inactivityTime	{ 1 3 14 2 2 4 16 }	x	m	x	x	x	x						
C.4.7.2.16	maxPDUSize	{ 1 3 14 2 2 4 26 }	x	m	x	x	x	x						
C.4.7.2.17	"Rec. X.721 ISO/IEC 10165-2 : 1992": pduSentCounter	{ 2 9 3 2 7 88 }	x	m	x	x	x	x						
C.4.7.2.18	"Rec. X.721 ISO/IEC 10165-2 : 1992": pduReceivedCounter	{ 2 9 3 2 7 86 }	x	m	x	x	x	x						

Index	Attribute Template Label	Value of Object Identifier for Attribute	Status					Support					Additional Information
			present	absent	optional	mandatory	optional	present	absent	optional	mandatory	optional	
E.4.7.2.19	"Rec. X.721 ISO/IEC 10165-2 : 1992": octetsSentCounter	(2 9 3 2 7 80)	x	m	x	x	x	x					
E.4.7.2.20	"Rec. X.721 ISO/IEC 10165-2 : 1992": octetsReceivedCounter	(2 9 3 2 7 78)	x	m	x	x	x	x					
E.4.7.2.21	"Rec. X.721 ISO/IEC 10165-2 : 1992": incomingProtocolErrorCounter	(2 9 3 2 7 77)	x	m	x	x	x	x					
E.4.7.2.22	transportConnectionId	(1 3 14 2 2 4 56)	x	m	x	x	x	x					
E.4.7.2.23	"Rec. X.721 ISO/IEC 10165-2 : 1992": allomorphs	(2 9 3 2 7 50)	x	c1	x	x	x	x					
E.4.7.2.24	"Rec. X.721 ISO/IEC 10165-2 : 1992": nameBinding	(2 9 3 2 7 63)	x	m	x	x	x	x					
E.4.7.2.25	"Rec. X.721 ISO/IEC 10165-2 : 1992": objectClass	(2 9 3 2 7 65)	x	m	x	x	x	x					
E.4.7.2.26	"Rec. X.721 ISO/IEC 10165-2 : 1992": packages	(2 9 3 2 7 66)	x	c2	x	x	x	x					

c0 = m if an instance supports it, else -

c1 = m if an object supports allomorphism, else -

c2 = m if any any registered package (other than this package) has been instantiated, else -

Table C.4.7.5 - Notification Support

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support	Add Info	Sub-Index	Notification Field Name Label	Value of OID of Attribute associated with Field	Status	Support	Additional Information
C.4.7.5.1	"Rec. X.721 ISO/IEC 10165-2 : 1992": attributeValueChange	{ 2 9 3 2 10 1 }	m			C.4.7.5.1.1	additionalInfo	{ 2 9 3 2 7 6 }			
						C.4.7.5.1.2	additionalText	{ 2 9 3 2 7 7 }			
						C.4.7.5.1.3	attributeIdentifierList	{ 2 9 3 2 7 8 }			
						C.4.7.5.1.4	attributeValueChangeDefinition	{ 2 9 3 2 7 10 }	m		
						C.4.7.5.1.5	correlatedNotifications	{ 2 9 3 2 7 12 }			
						C.4.7.5.1.6	notificationIdentifier	{ 2 9 3 2 7 16 }			
						C.4.7.5.1.7	sourceIndicator	{ 2 9 3 2 7 26 }			
C.4.7.5.2	"Rec. X.721 ISO/IEC 10165-2 : 1992": objectCreation	{ 2 9 3 2 10 6 }	m			C.4.7.5.2.1	additionalInfo	{ 2 9 3 2 7 6 }			
						C.4.7.5.2.2	additionalText	{ 2 9 3 2 7 7 }			
						C.4.7.5.2.3	attributeList	{ 2 9 3 2 7 9 }			
						C.4.7.5.2.4	correlatedNotifications	{ 2 9 3 2 7 12 }			
						C.4.7.5.2.5	notificationIdentifier	{ 2 9 3 2 7 16 }			
						C.4.7.5.2.6	sourceIndicator	{ 2 9 3 2 7 26 }			
C.4.7.5.3	"Rec. X.721 ISO/IEC 10165-2 : 1992": objectDeletion	{ 2 9 3 2 10 7 }	m			C.4.7.5.3.1	additionalInfo	{ 2 9 3 2 7 6 }			
						C.4.7.5.3.2	additionalText	{ 2 9 3 2 7 7 }			
						C.4.7.5.3.3	attributeList	{ 2 9 3 2 7 9 }			
						C.4.7.5.3.4	correlatedNotifications	{ 2 9 3 2 7 12 }			
						C.4.7.5.3.5	notificationIdentifier	{ 2 9 3 2 7 16 }			

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support	Add Info	Sub-Index	Notification Field Name Label	Value of OID of Attribute associated with Field	Status	Support	Additional Information
						C.4.7.5.3.6	sourceIndicator	(2 9 3 2 7 6)			
C.4.7.5.4	"Rec. X.721 ISO/IEC 10165-2 : 1992": communications Alarm	(2 9 3 2 10 2)	c0			C.4.7.5.4.1	additionalInfo	(2 9 3 2 7 6)			
						C.4.7.5.4.2	additionalText	(2 9 3 2 7 7)			
						C.4.7.5.4.3	backUpObject	(2 9 3 2 7 41)			
						C.4.7.5.4.4	backedUpStatus	(2 9 3 2 7 11)			
						C.4.7.5.4.5	correlatedNotifications	(2 9 3 2 7 12)			
						C.4.7.5.4.6	notificationId	(2 9 3 2 7 16)			
						C.4.7.5.4.7	perceivedSeverity	(2 9 3 2 7 17)			
						C.4.7.5.4.8	probableCause	(2 9 3 2 7 18)			
						C.4.7.5.4.9	proposedRepairActions	(2 9 3 2 7 19)			
						C.4.7.5.4.10	specificProblems	(2 9 3 2 7 27)			
						C.4.7.5.4.11	stateChangeDefinition	(2 9 3 2 7 28)			
						C.4.7.5.4.12	thresholdInfo	(2 9 3 2 7 29)			
						C.4.7.5.4.13	trendIndication	(2 9 3 2 7 30)			

c0 = m if instance supports it, else -

C.4.8 Transport Connection IVMO MOCS Proforma

Managed Object class template label	Value of Object Identifier for class
"DP1 Library Vol. 2":transportConnectionIVMO	(1 3 14 2 1 1 1)

Are all mandatory features of the class supported? Yes _____
 No _____

Table C.4.8.1 - Name Binding Support

Index	Name Binding Template Label	Value of Object Identifier for Name Binding	Superior Object Class Template Label	Status	Support	Status		Support		Additional Information
						create	delete	create	delete	
C.4.8.1.1	transportConnectionIvmo-coTransportProtocolLayerEntity	C 1 3 14 2 1 3 1	"OP1 Library Vol. 1"; coTransportProtocolLayerEntity	o		x	x			

Table C.4.8.2 - Attribute Support

Index	Attribute Template Label	Value of Object Identifier for Attribute	Status						Support						Additional Information
			set by create	get	replace	add	remove	set by default	set by create	get	replace	add	remove	set by default	
C.4.8.2.1	"OP1 Library Vol. 1":inactivityTimeout	{ 1 3 14 2 2 4 17 }	m	m	m	x	x	x							
C.4.8.2.2	"OP1 Library Vol. 1":maxPDUSize	{ 1 3 14 2 2 4 26 }	m	m	m	x	x	x							
C.4.8.2.3	transportConnectionVMold	{ 1 3 14 2 1 4 1 }	x	m	x	x	x	x							
C.4.8.2.4	"Rec. X.721 ISO/IEC 10165-2 : 1992":allomorphs	{ 2 9 3 2 7 50 }	x	c1	x	x	x	x							
C.4.8.2.5	"Rec. X.721 ISO/IEC 10165-2 : 1992":nameBinding	{ 2 9 3 2 7 63 }	x	m	x	x	x	x							
C.4.8.2.6	"Rec. X.721 ISO/IEC 10165-2 : 1992":objectClass	{ 2 9 3 2 7 65 }	x	m	x	x	x	x							
C.4.8.2.7	"Rec. X.721 ISO/IEC 10165-2 : 1992":packages	{ 2 9 3 2 7 66 }	x	c2	x	x	x	x							

c1 = m if an object supports allomorphism, else -

c2 = m if any any registered package (other than this package) has been instantiated, else -

Table C.4.8.5 - Notification Support

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support		Add Info	Sub-Index	Notification Field Name Label	Value of OID of Attr Type associated with Field	Status	Support	Additional Information
				Con	Non							
C.4.8.5.1	"Rec. X.721 ISO/IEC 10165-2 : 1992": attributeValueChange	(2 9 3 2 10 1)	M					C.4.8 .5.1.1 additionalInformation	(2 9 3 2 7 6)	P		
								C.4.8 .5.1.2 additionalText	(2 9 3 2 7 7)	P		
								C.4.8 .5.1.3 attributeIdentifierList	(2 9 3 2 7 8)	P		
								C.4.8 .5.1.4 attributeValueChangeDefinition	(2 9 3 2 7 10)	M		
								C.4.8 .5.1.5 correlatedNotifications	(2 9 3 2 7 12)	P		
								C.4.8 .5.1.6 notificationIdentifier	(2 9 3 2 7 16)	P		
								C.4.8 .5.1.7 sourceIndicator	(2 9 3 2 7 26)	P		
C.4.8.5.2	"Rec. X.721 ISO/IEC 10165-2 : 1992": objectCreation	(2 9 3 2 10 6)	M					C.4.8 .5.2.1 additionalInformation	(2 9 3 2 7 6)	P		
								C.4.8 .5.2.2 additionalText	(2 9 3 2 7 7)	P		
								C.4.8 .5.2.3 attributeList	(2 9 3 2 7 9)	P		
								C.4.8 .5.2.4 correlatedNotifications	(2 9 3 2 7 12)	P		
								C.4.8 .5.2.5 notificationIdentifier	(2 9 3 2 7 16)	P		
								C.4.8 .5.2.6 sourceIndicator	(2 9 3 2 7 26)	P		
C.4.8.5.3	"Rec. X.721 ISO/IEC 10165-2 : 1992": objectDeletion	(2 9 3 2 10 7)	M					C.4.8 .5.3.1 additionalInformation	(2 9 3 2 7 6)	P		
								C.4.8 .5.3.2 additionalText	(2 9 3 2 7 7)	P		
								C.4.8 .5.3.3 attributeList	(2 9 3 2 7 9)	P		
								C.4.8 .5.3.4 correlatedNotifications	(2 9 3 2 7 12)	P		
								C.4.8 .5.3.5 notificationIdentifier	(2 9 3 2 7 16)	P		

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support	Add Info	Sub-Index	Notification Field Name Label	Value of OID of Attr Type associated with Field	Status	Support	Additional Information
						C.4.8.5.3.6	sourceIndicator	(2 9 3 2 6 7 26)			

C.4.9 Transport Connection Retransmission IVMO MOCS Proforma

Managed Object class template label	Value of Object Identifier for class
"OP1 Library Vol. 2":transportConnectionRetransmissionIVMO	{ 1 3 14 2 1 1 2 }

Are all mandatory features of the class supported? Yes _____
 No _____

Table C.4.9.1 - Name Binding Support

Index	Name Binding Template Label	Value of Object Identifier for Name Binding	Superior Object Class Template Label	Status	Support	Status	Support	Additional Information
						create	delete	
C.4.9.1.1	transportConnectionIVMO-coTransportProtocolLayerEntity	{ 1 3 14 2 1 3 1 }	"OP1 Library Vol. 1":coTransportProtocolLayerEntity			x	x	
C.4.9.1.2	transportConnectionRetransmissionIVMO-coTransportProtocolLayerEntity	{ 1 3 14 2 1 3 2 }	"OP1 Library Vol. 1":coTransportProtocolLayerEntity			x	x	

Table C.4.9.2 - Attribute Support

Index	Attribute Template Label	Value of Object Identifier for Attribute	Status						Support						Additional Information
			set by create	get	read	read by default	set by create	get	read	read by default	set by create	get	read	read by default	
C.4.9.2.1	"OP1 Library Vol. 1":maxRetransmissions	{ 1 3 14 2 2 4 27 }	m	m	m	x	x	x							
C.4.9.2.2	"OP1 Library Vol. 1":retransmissionTimerInitialValue	{ 1 3 14 2 2 4 49 }	m	m	m	x	x	x							
C.4.9.2.3	"OP1 Library Vol. 1":inactivityTimeout	{ 1 3 14 2 2 4 17 }	m	m	m	x	x	x							
C.4.9.2.4	"OP1 Library Vol. 1":maxPDUSize	{ 1 3 14 2 2 4 26 }	m	m	m	x	x	x							
C.4.9.2.5	transportConnectionIVMId	{ 1 3 14 2 1 4 1 }	x	m	x	x	x	x							
C.4.9.2.6	"Rec. X.721 ISO/IEC 10165-2 : 1992":allomorphs	{ 2 9 3 2 7 50 }	x	c1	x	x	x	x							
C.4.9.2.7	"Rec. X.721 ISO/IEC 10165-2 : 1992":nameBinding	{ 2 9 3 2 7 63 }	x	m	x	x	x	x							
C.4.9.2.8	"Rec. X.721 ISO/IEC 10165-2 : 1992":objectClass	{ 2 9 3 2 7 65 }	x	m	x	x	x	x							
C.4.9.2.9	"Rec. X.721 ISO/IEC 10165-2 : 1992":packages	{ 2 9 3 2 7 66 }	x	c2	x	x	x	x							

c1 = m if an object supports allomorphism, else -

c2 = m if any any registered package (other than this package) has been instantiated, else -

Table C.4.9.5 - Notification Support

Index	Notification Type Label	Value of Notification Type Identifier	Status	Support	Add Info	Sub-Index	Notification Field Name Label	Value of OID of Attribute Type associated with Field	Status	Support	Additional Information
C.4.9.5.1	"Rec. X.721 ISO/IEC 10165-2 : 1992": attributeValueChange	{ 2 9 3 2 10 1 }	m			C.4.9.5.1.1	additionalInfo	{ 2 9 3 2 7 6 }			
						C.4.9.5.1.2	additionalText	{ 2 9 3 2 7 7 }			
						C.4.9.5.1.3	attributeIdentifierList	{ 2 9 3 2 7 8 }			
						C.4.9.5.1.4	attributeValueChangeDefinition	{ 2 9 3 2 7 10 }	m		
						C.4.9.5.1.5	correlatedNotifications	{ 2 9 3 2 7 12 }			
						C.4.9.5.1.6	notificationIdentifier	{ 2 9 3 2 7 16 }			
						C.4.9.5.1.7	sourceIndicator	{ 2 9 3 2 7 26 }			
C.4.9.5.2	"Rec. X.721 ISO/IEC 10165-2 : 1992": objectCreation	{ 2 9 3 2 10 6 }	m			C.4.9.5.2.1	additionalInfo	{ 2 9 3 2 7 6 }			
						C.4.9.5.2.2	additionalText	{ 2 9 3 2 7 7 }			
						C.4.9.5.2.3	attributeList	{ 2 9 3 2 7 9 }			
						C.4.9.5.2.4	correlatedNotifications	{ 2 9 3 2 7 12 }			
						C.4.9.5.2.5	notificationIdentifier	{ 2 9 3 2 7 16 }			
						C.4.9.5.2.6	sourceIndicator	{ 2 9 3 2 7 26 }			
C.4.9.5.3	"Rec. X.721 ISO/IEC 10165-2 : 1992": objectDeletion	{ 2 9 3 2 10 7 }	m			C.4.9.5.3.1	additionalInfo	{ 2 9 3 2 7 6 }			
						C.4.9.5.3.2	additionalText	{ 2 9 3 2 7 7 }			
						C.4.9.5.3.3	attributeList	{ 2 9 3 2 7 9 }			
						C.4.9.5.3.4	correlatedNotifications	{ 2 9 3 2 7 12 }			
						C.4.9.5.3.5	notificationIdentifier	{ 2 9 3 2 7 16 }			

Index	Notification Type Label	Value of Notification Type Identifier	Stat us	Support t n f	Add Info	Sub- Index	Notification Field Name Label	Value of OID of Attr Type associated with Field	Stat us	Support	Additional Information
						C.4.9	sourceIndicato	(2 9 3 2 7 6			
						.5.3.r		26)			
						6					

Annex D (normative)

Management Ensemble Annex

(Refer to the Working Implementation Agreements Document.)

Stable Implementation Agreements for Open Systems Interconnection Protocols: Part 19 - Remote Database Access

Output from the September 1992 Open Systems
Environment Implementors' Workshop (OIW)

SIG Chair: Peter Eng, IBM Canada
SIG Editor: Peter Eng, IBM Canada

Foreword

This part of the Stable Implementation Agreements was prepared by the Remote Database Access (RDA) Special Interest Group (RDASIG) of the Open Systems Environment Implementors' Workshop (OIW). See Procedures Manual for Workshop charter.

Text in this part has been approved by the Plenary of the above-mentioned Workshop.

Future changes and additions to this version of these Implementor Agreements will be published as change pages. Deleted and replaced text will be shown as struckout. New and replacement text will be shown as shaded.

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Part 19 - Remote Database Access

Editor's Note - This section serves as a placeholder for text provided by the Remote Database Access (RDA) Special Interest Group.

Stable Implementation Agreements for Open Systems Interconnection Protocols: Part 20 - Manufacturing Message Specification (MMS)

Output from the September 1992 Open Systems
Environment Implementors' Workshop (OIW)

SIG Chair: **John Baier, Allen-Bradley**
SIG Editor: **Neal Laurance, Ford**

Foreword

This part of the Stable Implementation Agreements was prepared by the Manufacturing Message Specification (MMS) Special Interest Group (MMSSIG) of the Open Systems Environment Implementors' Workshop (OIW). See Procedures Manual for Workshop charter.

Text in this part has been approved by the Plenary of the above-mentioned Workshop. No significant technical change has occurred in this part since it was previously presented.

Future changes and additions to this version of these Implementor Agreements will be published as change pages. Deleted and replaced text will be shown as ~~strikeout~~. New and replacement text will be shown as shaded.

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Part 20 - Manufacturing Message Specification (MMS)

0 Introduction

This section defines Implementors Agreements based on Manufacturing Message Specification (MMS), as defined in ISO/IEC 9506. ISO/IEC 9506 has two parts. Part 1 defines the Virtual Manufacturing Device (VMD), its subordinate abstract objects, and the services on these objects. Part 2 defines the protocol. Future parts may define companion standards.

MMS, as described in ISO/IEC 9506, is based on the following ISO documents: ACSE Service and Protocol (ISO 8649, ISO 8650), Presentation Service and Protocol (ISO 8822, ISO 8823), ASN.1 Abstract Syntax Notation and Basic Encoding Rules (ISO 8824, ISO 8825), and Session Service and Protocol (ISO 8326, ISO 8327). These services and protocols are defined architecturally in the OSI Reference Model (ISO 7498). These agreements provide detailed guidance for the implementor, and eliminate ambiguities in interpretations.

An A-Profile based on MMS and these agreements can be used over any T-Profile (see ISO TR 10000) specifying the OSI connection-mode transport service, or the transport profiles used in support of MAP (Manufacturing Automation Protocol), TOP (Technical and Office Protocols), or US GOSIP.

1 Scope

2 Field of Application

2.1 General

Work on implementation agreements will proceed in phases based upon grouping of services and/or contexts. Implementations are not constrained from implementing services or contexts not addressed by the current set of stable agreements. Future phases of work may affect such implementations.

2.2 Phase 1 agreements

These agreements will be based on a subset of MMS services and protocol listed in table 1 and defined in ISO/IEC 9506-1 and ISO/IEC 9506-2.

Table 1 - Phase 1 Services

Initiate
Conclude
Reject
Abort
Status
GetNameList
Identify
UnsolicitedStatus
GetCapabilityList
InitiateDownloadSequence
DownloadSegment
TerminateDownloadSequence
InitiateUploadSequence
UploadSegment
TerminateUploadSequence
DeleteDomain
GetDomainAttributes
Read
Write
InformationReport
GetVariableAccessAttributes
Input
Output
CreateProgramInvocation
DeleteProgramInvocation
Start
Stop
Resume
Reset
Kill
GetProgramInvocationAttributes

3 Normative References

- [1] ISO/IEC 9506-1: 1990 - *Industrial automation systems - Manufacturing Message Specification Part 1: Service definition*
- [2] ISO/IEC 9506-2: 1990 - *Industrial automation systems - Manufacturing Message Specification Part 2: Protocol specification*

4 Definitions

The definitions given in ISO/IEC 9506-1 are applicable to this document.

In addition the following definitions are used in this document:

MMS Implementation a term used to describe a system which conforms to ISO/IEC 9506, acting either as client or server, when it is unnecessary to distinguish between the MMS-user and the MMS-provider.

MMSpdu Any valid value of the MMSpdu abstract data type as defined in Clause 7 of ISO/IEC 9506-2, except for the initiate-RequestPDU, initiate-ResponsePDU, and initiate-ErrorPDU choices, encoded in the negotiated transfer syntax.

5 Corrigenda and addenda

(Refer to Working Agreements.)

6 Status

(Refer to Working Agreements.)

7 General agreements

7.1 Max supported PDU size

The `max_mms_pdu_size` is defined as the maximum number of octets in an MMSpdu encoded using the negotiated transfer syntax. This size shall apply to all MMSpdu's with the exception of the initiate-Request PDU, initiate-Response PDU, and initiate-Error PDU. The `max_mms_pdu_size` shall be negotiated during connection initiation using the Local Detail Calling and Local Detail Called parameters of the MMS initiate service.

The negotiated `max_mms_pdu_size` shall be applied as follows:

- a) Any received MMSpdu whose length is less than or equal to the negotiated `max_mms_pdu_size` shall be properly parsed and processed.
- b) An MMS implementation should not send an MMSpdu whose size exceeds the negotiated `max_mms_pdu_size`. If an MMS implementation sends an MMSpdu that exceeds the negotiated `max_mms_pdu_size`, then it shall be prepared to receive a reject pdu. Should an MMS implementation receive an MMSpdu that exceeds the negotiated `max_mms_pdu_size`, it shall either reject the MMSpdu or accept the MMSpdu as if no size violation had occurred and perform the expected processing.

- c) If an MMS implementation is unable to send a service response because the response would exceed the `max_mms_pdu_size`, then it shall return a Service response (-) with an error class of SERVICE and an error code of OTHER.
- d) When rejecting an MMSPDU because it exceeds the negotiated `max_mms_pdu_size`, an MMS implementation shall use a Reject PDU Type of PDU-ERROR and a Reject Code of INVALID-PDU in the resulting reject pdu.

7.2 FileName

Restrictions for the use of the type FileName in the MMS Abstract Syntax are specified in section 9.1 of part 9 of these agreements.

8 Service-specific agreements

8.1 Environment and general management

8.1.1 Initiate

8.1.1.1 Negotiation of MMS abstract syntaxes

On the A-ASSOCIATE response, the MMS responder shall not accept more than one presentation context derived from an MMS abstract syntax. For this agreement, the term 'MMS abstract syntax' shall represent an abstract syntax from the set containing the abstract syntax defined in clause 19 of ISO/IEC 9506-2 and abstract syntaxes defined by MMS companion standards.

NOTE - There are technical problems with describing operation in multiple MMS abstract syntaxes over a single association. These problems have been identified as of 9/90, and form the basis of the prior agreement.

8.1.1.2 Max serv outstanding

An MMS Implementation which intends to conform only with the Client Conformance Requirements for Requester CBBs shall:

- a) propose one or greater for the value of the Proposed Max Serv Outstanding Called parameter in the Initiate service when initiating the application association (calling);
- b) offer one or greater for the value of the Negotiated Max Serv Outstanding Calling parameter in the Initiate service when receiving the application association initiation (called).

An MMS Implementation which intends to conform to one or more Server Conformance Requirements for Responder CBBs shall:

- a) propose one or greater for the value of the Proposed Max Serv Outstanding Calling parameter in the Initiate service when initiating the application association (calling);
- b) offer one or greater for the value of the Negotiated Max Serv Outstanding Called parameter in the Initiate service when receiving the application association initiation (called).

8.1.1.3 Local detail calling

The local detail calling parameter in the initiate request primitive shall specify the `max_mms_pdu_size` guaranteed to be supported by the calling MMS implementation. If the local detail calling parameter is absent from the request primitive, then the calling MMS implementation guarantees support for an unlimited `max_mms_pdu_size`.

If present in the request or indication primitives, the local detail calling parameter shall not be less than 64; however, it is recommended that at least 512 octets be supported.

8.1.1.4 Local detail called

The local detail called parameter in the initiate response shall specify the negotiated `max_mms_pdu_size` for the application association.

If the local detail calling parameter was omitted in the indication primitive, then the local detail called parameter:

- a) may be omitted from the response, indicating that the calling MMS implementation and the called MMS implementation are prepared to support an unbounded `max_mms_pdu_size`;
- b) may be specified in the response, indicating a requirement to support the specified value for `max_mms_pdu_size`.

If the local detail calling parameter was included in the request, then this parameter shall be present in the response and its value shall be less than or equal to the value of the local detail calling parameter of the request.

If present in the response, the local detail called parameter shall not be less than 64; however, it is recommended that at least 512 octets be supported.

8.2 VMD support

8.3 Domain management

8.3.1 List of capabilities

Only one capability shall be described in each Visible String of the SEQUENCE OF.

8.3.2 Initiate Download Sequence service

The List of Capability parameter shall follow the limitations of 8.3.1.

The syntax and semantics of the capabilities shall be defined by the Server in the PICS. Any deviation from the defined syntax and semantics shall be grounds for the Server to return a service error with Error Class = RESOURCE and Error Code = CAPABILITY-UNKNOWN.

8.3.3 Download Segment service

A client that receives a Download Segment indication after issuing a Download Segment Result(+) with the MoreFollows parameter equal to FALSE or after issuing a Download Segment Result(-) shall issue either a service error, specifying an Error Class = SERVICE and an Error Code = PRIMITIVES-OUT-OF-SEQUENCE, or an Abort request.

8.3.4 Terminate Download Sequence service

If a client receives a Terminate Download Sequence indication in which the Discard parameter is absent and the client has not issued a Download Segment response with the More Follows parameter = FALSE for that Domain, it shall behave as if it had received a Terminate Download Sequence indication with the Discard parameter present with error class = VMD-STATE and error code = DOMAIN-TRANSFER-PROBLEM. It is then up to the client application to determine the true state of the Domain and take any recovery action.

8.3.5 Initiate Upload Sequence service

The List of Capability parameter shall follow the limitations of 8.3.1.

8.3.6 Upload Segment service

A server that receives an Upload Segment indication for an Upload State Machine for which it has issued an Upload Segment Result(-) or an Upload Segment Result(+) with the MoreFollows parameter equal to FALSE, shall issue either a service error, specifying an Error Class = SERVICE and an Error Code = PRIMITIVES-OUT-OF-SEQUENCE, or an Abort request.

8.3.7 Get Domain Attributes service

The List of Capability parameter shall follow the limitations of 8.3.1.

8.3.8 Get Capability List service

The List of Capability parameter shall follow the limitations of 8.3.1.

8.4 Program Invocation management

8.4.1 Start service

A ProgramInvocationState of non-existent shall be returned in a Result(-) when a request to Start a non-existent Program Invocation is received.

8.4.2 Stop service

A ProgramInvocationState of non-existent shall be returned in a Result(-) when a request to Stop a non-existent Program Invocation is received.

8.4.3 Resume service

A ProgramInvocationState of non-existent shall be returned in a Result(-) when a request to Resume a non-existent Program Invocation is received.

8.4.4 Reset service

A ProgramInvocationState of non-existent shall be returned in a Result(-) when a request to Reset a non-existent Program Invocation is received.

8.5 Variable access

8.5.1 Scattered access

It is strongly recommended that for services which use variable access, a Variable List Name or List of Variable be used instead of Scattered Access.

No implementations shall be required to propose or accept the VSCA Parameter CBB.

8.5.2 Floating point

It is strongly recommended for services which use floating point types or values, that the choice of floating-point in the Data and TypeSpecification productions be used instead of the real choice.

No implementations shall be required to propose or accept the REAL parameter CBB.

8.6 Semaphore management

Semaphore services are not considered in Phase 1.

8.7 Operator communication

No Operator Communication agreements have been identified to date.

8.8 Event management

Event Management services are not considered in Phase 1.

8.9 Journal management

Journal Management services are not considered in Phase 1.

Annex A (normative)

Backwards compatibility agreements**A.1 Introduction**

There is an installed base of real DIS 9506 based implementations. Providing support for application connectivity to both DIS and IS is desired as a migration strategy. These implementation agreements will allow IS based implementations to interoperate with DIS based implementations as described in ANNEX B. To achieve this backwards compatibility, the IS implementation shall support all of the agreements in this section.

It was found that the Abstract Syntax name object identifiers of both DIS and IS were identical. Therefore, the use of zero as the version number allows differentiation between an IS and a DIS based implementation. Since the abstract syntax name object identifier of any companion standard is different from that used by the DIS implementations, DIS implementations cannot interoperate with IS based implementations in a companion standard context.

NOTES

- 1 The value of zero is a valid value for this parameter in the DIS and not in the IS.
- 2 There are three types of implementations when considering MMS backwards compatibility.

- IMP-1:** An implementation based on DIS 9506 as described in Annex B;
- IMP-2:** An implementation based on IS 9506 with no backwards compatibility agreements applied;
- IMP-3:** An implementation based on IS 9506 which includes the backwards compatibility agreements of this annex. Such an implementation can dynamically negotiate to interoperate with an IMP-1, an IMP-2, or an IMP-3 implementation.

Since the value of the minor version number is zero for DIS-based implementations, and is one or greater for implementations of ISO/IEC 9506, this value can be used to differentiate between IMP-1 and IMP-2. An IMP-3 system can interoperate with either of these systems. If an IMP-3 is the Calling system, it will offer a value of one (or greater) for the proposed version number. An IMP-1 system will respond with a value of the negotiated version number of zero, using the negotiation procedure defined in ISO/IEC 9506. The IMP-3 system will accept this response. If the IMP-3 system is the Called system and has received an Initiate request with a value of zero for the proposed version number (from an IMP-1 system), it will respond with a value of zero for the negotiated version number. By following this procedure, an IMP-3 can interoperate with an IMP-2 or with another IMP-3 viewed as an IMP-2. After association context establishment, an IMP-3 system shall behave as either an IMP-1 or an IMP-2 system as appropriate on that particular association. The remainder of this section describes additional agreements which change an IMP-2 implementation into an IMP-3 implementation.

A.2 Backwards compatibility agreements for calling MMS implementations

A calling MMS implementation shall be capable of receiving and supporting a negotiatedVersionNumber parameter in the Initiate Service confirm of zero.

A calling MMS implementation which has received a negotiatedVersionNumber parameter in the Initiate Service confirm of zero shall support the modifications described in A.4.

A calling MMS implementation shall be capable of receiving an Application Context Name parameter value appropriate to an IMP-1 or IMP-2 in the A-Associate confirm.

A calling MMS implementation which has received a negotiatedVersionNumber of zero shall be capable of receiving and supporting an Initiate Response which has been encoded according to the modifications described in Appendix B, specifically the capability of receiving and supporting a negotiatedParameterCBB containing exactly 7 bits.

If a calling MMS implementation receives an Initiate confirm primitive with a negotiatedVersionNumber parameter equal to zero, the calling MMS implementation shall support the VLIS conformance building block if the implementation claims support for any service which contains one or more parameters which indicate the VLIS CBB in its service definition.

A.3 Backwards compatibility agreements for called MMS implementations

A called MMS implementation shall be capable of receiving and supporting a proposedVersionNumber parameter in the Initiate Service indication of zero.

A called MMS implementation which has received a proposedVersionNumber parameter in the Initiate Service indication of zero shall support the modifications in A.4.

A called MMS implementation shall be capable of receiving an Application Context Name parameter appropriate to an IMP-1 or IMP-2 in the A-Associate indication.

A called MMS implementation shall be capable of receiving and supporting an Initiate Request which has been encoded according to the modifications described in Appendix B, specifically the capability of receiving and supporting a proposedParameterCBB containing exactly 7 bits.

If a called MMS implementation receives an Initiate indication primitive with a proposedVersionNumber parameter equal to zero, the called MMS implementation shall support the VLIS conformance building block if the implementation claims support for any service which contains one or more parameters which indicate the VLIS CBB in its service definition.

A.4 General backwards compatibility agreements

A.4.1 VMD logical status

If the current VMD State is SUPPORT-SERVICES-ALLOWED and the association minor version number is zero, then the vmdLogicalStatus parameter shall have a value of STATE-CHANGES-ALLOWED in a Status response or in an unsolicitedStatus request.

Annex B (normative)

DIS 9506 Modifications Required for Backwards Compatibility**B.1 Introduction**

This annex is an integral part of this part. It documents the modifications to DIS 9506 required to describe implementations for which the agreements of this part provide backwards compatibility. This annex as applied to DIS 9506 is referred to as Version 0.

B.2 References

- [1] *MMS/1 Manufacturing Message Specification - ISO DIS 9506 - Service Definition*, December 1987
- [2] *MMS/2 Manufacturing Message Specification - ISO DIS 9506 - Protocol Specification*, December 1987
- [3] *NBS OSI Implementors Workshop Agreements* - December 1987

B.3 General**B.3.1 Implementation base**

Version 0 is based upon Reference [3] in B.2 as it applies to MMS.

B.3.2 Rules of extensibility

The following sentence is appended to the last paragraph in section 8.2.1.1.5.2 Proposed Parameter CBB and the last paragraph in section 8.2.1.2.5.2 Negotiated Parameter CBB of DIS 9506-1.

"Any additional bits shall be ignored."

B.4 Modifications to the protocol definitions**B.4.1 Page 39, Section 7.5.2 of DIS 9506-2**

CHANGE	
reportEventEnrollmentStatus	[60] IMPLICIT ReportEventEnrollmentStatus-Request,
TO	
reportEventEnrollmentStatus	[60] ReportEventEnrollmentStatus-Request,

B.4.2 Page 49, Section 7.6.4, DIS 9506-2

CHANGE	
ApplicationReference	::= SEQUENCE { ap-title ISO-8650-ACSE-1.AP-title OPTIONAL, ap-invocation-id ISO-86 50-ACSE-1.AP-invocation-id OPTIONAL, ae-qualifier ISO-8650-ACSE-1.AE-qualifier OPTIONAL, ae-invocation-id ISO-8650-ACSE-1.AE-invocation-id OPTIONAL }
TO	
ApplicationReference	::= SEQUENCE { ap-title [0] OBJECT IDENTIFIER OPTIONAL, ap-invocation-id [1] INTEGER OPTIONAL, ae-qualifier [2] INTEGER OPTIONAL, ae-invocation-id [3] INTEGER OPTIONAL }

B.4.3 Page 95, Section 12.2.1 of DIS 9506-2

CHANGE	
structure	[2] IMPLICIT SEQUENCE OF SEQUENCE {
TO	
structure	[2] IMPLICIT SEQUENCE {

B.4.4 Page 96, Section 12.3.1 of DIS 9506-2

CHANGE
named [4] IMPLICIT SEQUENCE {
TO
named [5] IMPLICIT SEQUENCE {

B.4.5 Page 98, Section 12.4.2 of DIS 9506-2

CHANGE
generalized-time [10] IMPLICIT GeneralizedTime,
TO
generalized-time [11] IMPLICIT GeneralizedTime,

B.4.6 Page 138, Section 15.14 of DIS 9506-2

CHANGE
additionalDetail [9] IMPLICIT EE-Additional-Detail OPTIONAL
TO
additionalDetail [9] EE-Additional-Detail OPTIONAL

B.4.7 Page 166, Section 17.10 of DIS 9506-2

CHANGE the transfer syntax object identifier value from
{ iso asn1(1) basic-encoding(1) }
TO
{ joint-iso-ccitt asn1(1) basic-encoding(1) }

B.5 Behavioral requirements

B.5.1 Filenames

File Names are specified in accordance with the NBS Implementors' agreements for FTAM Reference [3] in B.2.

B.5.2 Identify service

In the Identify service, the vendor, model and revision fields may be of any length, but only the first 64, 16, and 16 octets respectively are treated as significant.

B.5.3 Initiate service

An MMS Client will:

- a) propose 1 or greater for the value of the Proposed Max Serv Outstanding Called parameter in the Initiate service when initiating the application association (calling);
- b) offer 1 or greater for the value of the Negotiated Max Serv Outstanding Calling parameter in the Initiate service when receiving the application association initiation (called).

An MMS Server will:

- a) propose 1 or greater for the value of the Proposed Max Serv Outstanding Calling parameter in the Initiate service when initiating the application association (calling);
- b) offer 1 or greater for the value of the Negotiated Max Serv Outstanding Called parameter in the Initiate service when receiving the application association initiation (called).

B.5.3.1 Minimum segment size

MMS implementations are able to parse and process 512 octets of MMSPDU as they are encoded in ASN.1 basic encoding rules.

B.5.3.2 Maximum segment size

The Max Segment Size is defined as the maximum number of octets in an MMSPDU encoded using the negotiated transfer syntax. This size will apply to all MMSPDU's with the exception of the initiate-Request PDU, initiate-Response PDU, and the initiate-Error PDU. The max segment size will be negotiated during connection initiation using the Proposed Max Segment Size and Negotiated Max Segment Size parameters of the MMS initiate service.

The Max Segment Size will be applied as follows:

- a) Any received MMSpdu which is less than or equal to the Max Segment Size will be properly parsed and processed;
- b) An MMS implementation will not send an MMSpdu whose size exceeds the Max Segment Size.

B.5.4 Abstract syntax name

The ASN.1 object identifier value for the abstract syntax name will be the same as specified on page 166, section 17.10 of DIS 9506-2.

B.5.5 Application context name

The ASN.1 object identifier value for the application context name will be the same as specified on page 166, section 17.11 of DIS 9506-2.

An MMS implementation ignores the Application Context Name in the A-Associate indication and the A-Associate confirm.

B.5.6 Minor version number

The Minor Version Number is zero.

B.6 Parameter CBB subset

The following subset of MMS Parameter CBBs were considered during preparation of this annex:

- a) STR1;
- b) NEST;
- c) VADR;
- d) VNAME.

B.7 Service subset

The following subset of MMS services were considered during preparation of this annex.

Table 2 - MMS Service Subset

Initiate	Output
Conclude	TakeControl
Cancel	RelinquishControl
Status	ReportSemaphoreStatus
GetNameList	ReportPoolSemaphoreStatus
Identify	ReportSemaphoreEntryStatus
UnsolicitedStatus	CreateProgramInvocation
GetCapabilityList	DeleteProgramInvocation
InitiateDownloadSequence	Start
DownloadSegment	Stop
TerminateDownloadSequence	Resume
InitiateUploadSequence	Reset
UploadSegment	Kill
TerminateUploadSequence	GetProgramInvocationAttributes
RequestDomainDownload	ObtainFile
RequestDomainUpload	GetEventConditionAttributes
LoadDomainContent	ReportEventConditionStatus
StoreDomainContent	GetAlarmSummary
DeleteDomain	ReadJournal
GetDomainAttributes	WriteJournal
Read	InitializeJournal
Write	CreateJournal
InformationReport	DeleteJournal
GetVariableAccessAttributes	ReportJournalStatus
Input	



Stable Implementation Agreements for Open Systems Interconnection Protocols: Part 21 - Character Set

Output from the September 1992 Open Systems
Environment Implementors' Workshop (OIW)

SIG Editor: Wally Wedel, U.S. West Advanced Technologies

Foreword

This part of the Stable Implementation Agreements was prepared by the Workshop Chair of the Open Systems Environment Implementors' Workshop (OIW).

Text in this part has been approved by the Plenary of the above-mentioned Workshop.

Future changes and additions to this version of these Implementor Agreements will be published as change pages. Deleted and replaced text will be shown as struckout. New and replacement text will be shown as shaded.

Stable Implementation Agreements for Open Systems Interconnection Protocols: Part 22 - ODA Image DAP

Output from the September 1992 Open Systems
Environment Implementors' Workshop

SIG Chair: **James Wing, IBM**
SIG Editor: **Frank Spielman, NIST**

Foreword

This part of the Stable Implementation Agreements was prepared by the Office Document Architecture (ODA) Special Interest Group (SIG) of the Open Systems Environment Implementors' Workshop (OIW). Development of this document application profile has been done in liaison with several organizations. These include the DoD Computer-aided Acquisition and Logistic Support (CALS) Office, Navy's David Taylor Research Center, and the ad-hoc Tiling Task Group.

This document application profile is intended to be suitable for the interchange of large format raster images which may be annotated with character, raster, or geometric revisions.

This part contains four annexes:

- a) annex A (normative): Amendments and Corrigenda;
- b) annex B (informative): Recommended practices;
- c) annex C (informative): References to other standards and registers;
- d) annex D (informative): Supplementary information on attributes.

Future changes and additions to this version of these Implementor Agreements will be published as a new part. Deleted and replaced text will be shown as struckout. New and replacement text will be shown as shaded.

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Part 22 - ODA Image DAP

0 Introduction

This is the definition of a specification for an Open Document Architecture (ODA) Document Application Profile (DAP) named ODA Image DAP. This DAP is suitable for interchanging documents in formatted form. The documents contain primarily raster graphics images but may also contain character and geometric graphics content portions.

There are two DAP object identifiers supporting this DAP with the only difference being in the encoding of the data stream. One uses the ASN.1 based ODIF encoding. The other uses the SGML/SDIF based ODL encoding. When this document refers to *this profile*, it is referring to this specification regardless of which DAP identifier may be selected to create the data stream.

The DAP is defined in accordance with ISO 8613-1 and CCITT T.411 and follows the standardized proforma and notation defined in ISO 8613-1 Annex F. The DAP is based on ODA as defined in ISO 8613 and the Tiled Raster Graphics Addendum to ISO 8613, Part 7.

1 Scope and Field of Applications

This DAP specifies an interchange format suitable for transfer of structured documents between equipment designed for raster processing. The documents supported by this DAP are based on a paradigm of an electronic engineering drawing or illustration. Such documents contain one or more pages. Each page consists of a base image in the form of a bi-tonal raster graphics, character, or geometric graphics content. This base image may be further annotated with character, raster graphics or geometric graphics content. These latter content portions serve to provide revision control for the engineering drawing or illustration. There is no restriction on the minimum size of the base image.

This document defines a DAP that allows large format raster documents to be interchanged in a formatted form in accordance with ISO 8613.

It is assumed that, when negotiation is performed by the service using this DAP, all non-basic features are subject to negotiation.

This DAP is independent of the processes carried out in an end system to create, edit, or reproduce raster documents. It is also independent of the means to transfer the document which, for example, may be by means of communication links or exchanged storage media.

The features of a document that can be interchanged using this DAP fall into the following categories:

- a) Page format features - these concern how the layout of each page of a document will appear when reproduced;
- b) Raster graphics layout and imaging features - these concern how the document content will appear within pages of the reproduced document; and
- c) Raster graphics coding - these concern the raster graphics representations and control functions that make up the document raster graphics content.

2 Normative References

The following references are required in order to implement this DAP:

2.1 ISO

- [1] ISO 8613-1 : 1989, *Information processing - Text and Office Systems; Open Document Architecture (ODA) and Interchange Format - Part 1: Introduction and General Principles*;
- [2] ISO 8613-2 : 1989, *Information processing - Text and Office Systems; Open Document Architecture (ODA) and Interchange Format - Part 2: Document Structures*;
- [3] ISO 8613-4 : 1989, *Information processing - Text and Office Systems; Open Document Architecture (ODA) and Interchange Format - Part 4: Document Profile*;
- [4] ISO 8613-5 : 1989, *Information processing - Text and Office Systems; Open Document Architecture (ODA) and Interchange Format - Part 5: Open Document Interchange Format*;
- [5] ISO 8613-6 : 1989, *Information processing - Text and Office Systems; Open Document Architecture (ODA) and Interchange Format - Part 6: Character Content Architecture*;
- [6] ISO 8613-7 : 1989, *Information processing - Text and Office Systems; Open Document Architecture (ODA) and Interchange Format - Part 7: Raster Graphics Content Architectures*;
- [7] ISO 8613-8 : 1989, *Information processing - Text and Office Systems; Open Document Architecture (ODA) and Interchange Format - Part 8: Geometric Graphics Content Architectures*;
- [8] ISO 8613-1 : 1991, *Information processing - Text and Office Systems; Open Document Architecture (ODA) and Interchange Format - Part 1: Annex F - A Document Application Profile Proforma and Notation*;
- [9] ISO 8613-7 : (to be published), *Information processing - Text and Office Systems; Office Document Architecture (ODA) and Interchange Format - Part 7: Amendment - Tiled Raster Graphics Addendum to ISO 8613, Part 7*;
- [10] ISO 646 : 1990, *Information processing - ISO 7-bit coded character sets for information interchange*;
- [11] ISO 8859-1 : 1983, *Information processing - 8-bit Single-byte coded graphic character sets - Part 1: Latin alphabet No. 1*;
- [12] ISO 6937-2 : 1983, *Information processing - Coded character sets for text communication - Part 2: Latin alphabet and non-alphabetic characters*;
- [13] ISO 2022 : 1986, *Information processing - ISO 7-bit and 8-bit coded character sets - Code extension techniques*;

- [14] ISO 7350 : 1984, *Text communication - Registration of graphic character subrepertoires*;
- [15] ISO 8824 : 1987, *Information Processing Systems - Open Systems Interconnection - Specification of Abstract Syntax Notation One (ASN.1)*;
- [16] ISO 8825 : 1987, *Information Processing Systems - Open Systems Interconnection - Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1)*;
- [17] ISO 8879 : 1986, *Information processing - Text and office systems - Standard Generalized Markup Language (SGML)*;
- [18] ISO 9069 : 1988, *Information processing - SGML support facilities - SGML Document Interchange Format (SDIF)*.

2.2 CCITT

- [19] Recommendation T.4 : 1988, *Standardization of Group 3 Facsimile Apparatus for Document Transmission*.
- [1920] Recommendation T.6 : 1988, *Facsimile Coding Schemes and Coding Control Functions for Group 4 Facsimile Apparatus*.

3 Definitions and Terminology

3.1 Definitions

The definitions given in ISO 8613-1 are applicable to this document.

3.2 Constituent Names

Each constituent that may be included in a document that conforms to this profile has been given a unique name which serves to identify that constituent throughout this profile.

The convention is that full names are used (i.e., no abbreviations are used), two or more words in a name are concatenated and each word begins with a capital. Examples of constituent names used in this profile are CompositePage, DocumentLayoutRoot, and SpecificBlock.

In clause 6 of this profile, each constituent provided by this profile is underlined once at the point in the text at which the purpose of that constituent is defined. This also serves to identify all the constituents provided by this profile.

The same constituent names are also used in the technical specification in clause 7 of this profile so that there is a one-to-one correspondence between the use of these names in clauses 6 and 7.

Although the constituent names relate to the purpose of the constituents, the semantics of constituents must not be implied from the actual names that are used. Also, these names do not appear in an interchanged document but a mechanism for identifying constituents in an interchange document is provided. Thus in an application using this profile, the constituents may be known to the user by different names.

4 Relationship to other DAPs

Functionally, this DAP is a functional superset of the CCITT Recommendation T.503, A Document Application Profile for the Interchange of Group 4 Facsimile Documents.

5 Conformance

In order to conform to this DAP, a data stream representing a document must meet the requirements specified in 5.1.

The requirements for implementations that originate and/or receive data streams conforming to this DAP are specified in 5.2.

5.1 Data Stream Conformance

The following requirements apply to the encoding of data streams that conform to these agreements:

- a) The data stream shall be encoded in accordance with the ASN.1 encoding rules defined in ISO 8825 or the SGML encoding rules defined in ISO 8879;
- b) The data stream shall be structured in accordance with the interchange format defined in clause ~~8 of this DAP~~;
- c) The document shall be structured in accordance with only the formatted document architecture class specified in clause ~~7 of this DAP~~. In addition, the document shall contain all mandatory constituents specified for that class and may optionally contain constituents permitted for that class as specified in clause 7;
- d) Each constituent shall contain all those attributes specified as required for that constituent in this profile. Other attributes may be specified provided they are permitted for that constituent;
- e) The attributes shall have values within the range of permissible values specified in this profile;
- f) The encoded document shall be structured in accordance with the abstract document architecture defined in ISO 8613-2;
- g) The encoded document shall be structured in accordance with the characteristics defined in clause ~~6 of this DAP~~ and shall contain only those features defined in clause 6.

5.2 Implementation Conformance

This clause states the requirements for implementations claiming conformance to this DAP.

A conforming receiving implementation must be capable of receiving *either* any data streams conforming to this profile structured in accordance with ODIF *or* any data streams conforming to this profile structured in accordance with ODL *or* both of these. Receiving usually, but not always, involves recognizing and further processing the data stream elements.

6 Characteristics Supported by this DAP

This clause describes the characteristics of documents that can be represented by data streams conforming to this profile. This clause also describes how these characteristics are represented in terms of divisional components of the data streams.

6.1 Overview

This DAP describes the features of ISO 8613 that are needed to support the interchange of documents containing images. It specifies interchange formats for the transfer of structured documents with simple layout structures.

This DAP describes documents that can be interchanged in the formatted form, which facilitates the reproduction of a document as intended by the originator.

The content within the document forming the original or base image(s) may be formatted processable raster graphics, formatted processable geometric graphics, and/or formatted character. This is intended to facilitate the reproduction of the document content as intended by the originator or allows the reformatting of the document content.

The content allowed within the document to annotate revisions to the base image(s) may also be formatted processable raster graphics, formatted processable geometric graphics, and/or formatted character.

This clause describes the layout features that can be represented in documents conforming to this DAP. The features are described in terms that are typical of the user-perceived capabilities and semantics found in a raster document interchange environment.

For the purpose of interchange, a document is represented as a collection of **constituents**, each of which is represented by a set of attributes. The constituents that make up a formatted document are defined below in this clause and are illustrated in figure 1.

Document Profile
Generic Layout Structure (Optional)
Presentation Style (Optional)
Specific Layout Structure
Content Portion Description

Figure 1 - Constituents

Constituents defined as **required** must occur in any document that conforms to this profile. Constituents listed as **optional** may or may not be present in the document, depending on the requirements of the particular document.

The required constituents include:

- a) a document profile;
- b) layout object descriptions representing a specific layout structure;
- c) content portion description.

The only optional constituents are presentation style and generic layout structure.

6.2 Logical Constituents

Not applicable.

6.3 Layout Constituents

This clause describes the features of the layout objects that can be represented in documents conforming to this DAP.

6.3.1 Overview of the Layout Characteristics

The document structure allows the document content to be laid out and presented in one or more pages. Each page in a document may consist of a single raster graphics content. This would be the case for an original image of an engineering drawing, illustration, or other raster scanned image. Optionally, each page in a document may consist of an original image which contains raster graphics, geometric graphics, and/or character content, with additional character, raster graphics or geometric graphics content, representing a

set of revision annotations of the original image.

A specific layout structure of the document conforming to this application profile consists of a four-level hierarchy consisting of a document layout root, composite pages, frames, and blocks. The document can consist of multiple composite pages where each page represents a single image including any revision annotations. The composite pages consist of frames which in turn contain blocks containing the content associated with the base image and the revision annotation.

Figure 2 is an illustration of the features of the document layout structure supported by this DAP.

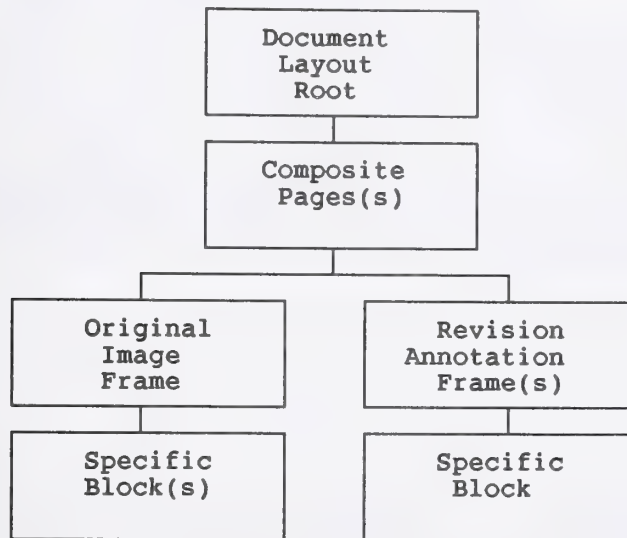


Figure 2 - Document layout structure

6.3.2 DocumentLayoutRoot

A DocumentLayoutRoot is the top level in a document layout structure. A DocumentLayoutRoot consists of a sequence of one or more CompositePage constituent constraints.

6.3.3 Page Characteristics

Only one constituent constraint is provided to present pages within a document.

A document consists of a sequence of one or more composite pages. In a document's composite page, two types of frames are used to position content information on the page. One frame type is used to position the content representing the original image on the page. Only one frame of this type is allowed per page, but it may contain any number of raster graphics, geometric graphics, or character content portions. The second frame type is used to position a character, raster graphics or geometric graphics content representing a revision annotation on the page. There may be one or more of the frames containing a revision annotation.

A document may consist of multiple pages of different sizes. Each page may be either landscape or portrait orientation. Both orientations are permitted in the document.

6.3.3.1 CompositePage

A CompositePage is a constituent constraint which defines a composite-page that corresponds to the page area used for presenting the sequence of an OriginalImage frame and zero or more RevisionAnnotation frames.

6.3.3.2 Page Dimensions

A wide variety of page dimensions are supported including large format raster documents. The dimensions of the pages may be specified as any value, in BMU measurement units, including the larger sizes produced from foldout-size images and roll paper. These sizes apply to both portrait and landscape orientations. The page sizes include: ISO A0-A5, ANSI A-K, Japanese legal and letter, foldouts 27.94 cm (11 in.) X 34.56 cm (14 in.) and 27.94 cm (11 in.) X 43.18 cm (17 in.), and 27.94 cm (11 in.) roll paper.

~~Dimensions equivalent to or less than the actual (nominal) page sizes of ANSI E in both portrait and landscape orientations are basic values. Larger dimensions (F-K) including those produced from roll paper are non-basic and their use must be indicated in the document profile. Although ISO A0-A4 sizes are not generally used, the A1-A4 sizes do fall within the range of the ANSI E sizes and therefore could be considered basic values (See table 2). A0 size is a non-basic value.~~

~~Dimensions equivalent to or less than the common assured reproduction area of ISO A4 and North American Letter (NAL) in portrait or landscape orientation are basic values. Larger page sizes including those produced from roll paper are non-basic and their use must be indicated in the document profile (See table 2).~~

The default dimensions are the Common Assured Reproduction Area (CARA) of North American Letter (A). Any default page dimensions may be specified in the document profile subject to the maximum dimensions defined above by using the Page-dimensions attribute. The Page-position attribute may be used to specify the position of the pel array image on the page. Although actual page dimensions may be used allowing for the raster content to completely fill a page leaving no borders, it is advised that the assured reproduction area (ARA) listed in table 1 be used wherever feasible. See 7.3 of ISO 8613-2 for general rules for positioning pages on presentation surfaces.

6.3.3.3 Nominal Page Sizes

The nominal page sizes that may be specified are listed in table 1. ~~In addition, 11 inch roll paper of any length is supported. These may be specified in portrait or landscape orientations. All values of nominal page size up to ANSI E size are basic. All sizes larger than ANSI E size and roll paper are non-basic and their use in a document must be indicated in the document profile using the Medium type attribute (See table 2). All values of nominal page size are non-basic and hence all values used in a document must be indicated in the document profile (See table 2).~~

Any of the nominal page sizes defined in table 1, subject to the restriction specified above, may be specified

as the default value in the document profile.

Table 1 also includes the recommended assured reproduction area (ARA). Information loss may occur when a document is reproduced if the dimensions of the CompositePage exceed the ARA for the specified nominal page size.

6.3.4 OriginalImage

An OriginalImage is a constituent constraint which defines a lowest level frame used for laying out the original image of an engineering drawing, illustration or other image. This frame contains one or more SpecificBlocks each of which may contain one of a character content portion, a raster graphics content portion, or a geometric graphics content portion. Note that there must be exactly one OriginalImage frame on each page.

This type of frame has a fixed position and dimensions. The position, if not specified, defaults to the origin of the page. The dimensions, if not specified, default to the maximum size that can be achieved for the position within the area of the page.

6.3.5 RevisionAnnotation

A RevisionAnnotation is a constituent constraint which defines a lowest level frame used for laying out the revision annotation associated with the original image. This frame contains a single SpecificBlock containing either a character content portion, a raster graphics content portion or a geometric graphics content portion.

This type of frame has a fixed position and dimensions. This provision provides for the capability of positioning of revision annotation anywhere on the page. Registration of revision annotation over a portion of the original image, as in revision artwork, is accomplished using this capability.

6.3.6 SpecificBlock

A SpecificBlock is a constituent constraint which defines a basic layout object used to position and image the content portions associated with either an OriginalImage or RevisionAnnotation frame.

The position of the block is fixed and defaults to the origin of the superior frame. The dimensions default to the maximum size that can be achieved for the position within the area of the superior frame.

6.3.7 GenericBlock

GenericBlock is a constituent constraint which defines a layout object class which can define content that is common and can be referenced throughout the document. Any content type (raster, character, or geometric graphics) can be defined using this technique.

Table 1 Dimensions for various page sizes

Page type	Size	Size (BMU)	ARA (BMU)
- Metric			
ISO-A5	148mm x 210mm	7015 x 9920	not defined
ISO-A4	210mm x 297mm	9920 x 14030	9240 x 13200
ISO-A3	297mm x 420mm	14030 x 19840	13200 x 18480
ISO-A2	420mm x 594mm	19840 x 28060	18898 x 27118
ISO-A1	594mm x 841mm	28060 x 39680	26173 x 37843
ISO-A0	841mm x 1189mm	39680 x 56120	37843 x 54283
- ANSI, North American (NA)			
NA-A	8.5in x 11in	10200 x 13200	9240 x 12400
NA-B	11in x 17in	13200 x 20400	12744 x 19656
NA-C	17in x 22in	20400 x 26400	19500 x 25800
NA-D	22in x 34in	26400 x 40800	25800 x 39600
NA-E	34in x 44in	40800 x 52800	39600 x 52200
NA-F	28in x 40in	33600 x 48000	32400 x 47400
NA-G	11in x 90in	13200 x 108000	12400 x 106800
NA-H	28in x 143in	33600 x 171600	31400 x 170400
NA-J	34in x 176in	40800 x 211200	39600 x 210000
NA-K	40in x 143in	48000 x 171600	47400 x 170400
NA-Legal	8.5in x 14in	10200 x 16800	9240 x 15480
- Foldouts			
Small	11in x 14in	13200 x 16800	12744 x 15480
NA-B	11in x 17in	13200 x 20400	12744 x 19656
- Japan			
Legal	257mm x 364mm	12141 x 17196	11200 x 15300
Letter	182mm x 257mm	8598 x 12141	7600 x 10200

Tutorial Note - These page sizes are for the portrait orientation.

Table 2 Layout attributes

Attributes	Basic values	Default values	Non-basic values
Page dimensions **	CARA NA-A-F, CARA NA-Legal, ISO-A4-A1, Small-Foldout CARA NA-A, ISO-A4	CARA NA-A	ARA NA GB-K, ISO A0-A3, Japan legal, 11" Roll Paper
Medium-type ** (Nominal page size)	NA-A-F, NA-Legal, ISO-A4-A1, Small-Foldout None	NA-A None	NA GA-K, ISO A0-A5, Japan letter & legal, 11" Roll Paper

Tutorial Note - See table 1 **

6.4 Document Layout Characteristics

This DAP provides for only formatted documents. Hence, no provision is made for constraining the document layout process other than as implied in the formatted documents supported by this DAP. In particular, these formatted documents are characterized by the following:

- Documents containing only composite pages;
- Documents may contain one or more pages;
- Pages may vary by orientation within a document;
- As a minimum, each page contains a single raster graphics, geometric graphics, or character content portion, representing the original image;
- Each page may additionally contain one or more character, raster graphics or geometric graphics content portions representing revision annotation;
- Content is positioned within fixed position and dimension frames.

6.5 Content Layout and Imaging Control

A document is modelled as an original image with optional revision annotation(s). The original image and the revision annotation(s) may be represented by either character, raster graphics, or geometric graphics content portions, as specified in ISO 8613-6, ISO 8613-7 and ISO 8613-8, respectively.

The content architectures that may be specified using the attribute *Content architecture class* are formatted character, formatted processable raster graphics and formatted processable geometric graphics. ~~The formatted processable raster graphics is the only content that~~ Any of the above contents may be specified as the default in the document profile.

6.5.1 Raster Graphics Content

6.5.1.1 Introduction

This clause defines the features that are applicable to the raster graphics content.

The default values for the following features may be specified in the document profile:

- a) type of coding (required);
- b) compression;
- c) pel path;
- d) line progression;
- e) pel spacing;
- f) spacing ratio;
- g) clipping.

The specification in a document of a non-basic feature by a presentation or coding attribute must be indicated in the document profile.

6.5.1.2 Raster Graphics Content Architecture

The formatted processable raster graphics content architecture is supported by this DAP and will frequently be the primary content architecture in a document. ~~This is the only default content architecture class that can be specified in the document profile.~~

In a composite page, multiple content portions may be associated with the original image, whereas only one content portion may be associated with a given revision annotation.

6.5.1.3 Raster Graphics Encoding Methods

~~Three encoding methods, CCITT T.6 (untiled), Tiled, and Bitmap are supported by this profile as basic values. Neither the CCITT T.4 one dimensional method nor the CCITT T.4 two dimensional method is supported.~~

~~The CCITT Recommendation T.6 Group 4 compression algorithm shall be used in all cases, tiled and untiled, except where it is more efficient to retain an image or tile image in bitmap format or to specify a tile as being either all background or all foreground.~~

~~The content may be encoded in accordance with the encoding schemes defined in CCITT Recommendations T.4 and T.6. In the case of T.4, either the one-dimensional or two dimensional encoding scheme may be used. Also the 'bit-map encoding' scheme defined in ISO 8613-7 may be used. All these forms of encoding may be used in a single document and all are basic values. 'Uncompressed' mode of encoding may also be used but only as a non-basic feature.~~

~~In a content portion, it is required that the Number of pels per line and Number of lines parameters of the Coding attributes be specified. The value of these parameters shall be a positive number. Otherwise, no constraints are placed on these parameters by this profile. In a content portion, it is required that the coding attribute "number-of-pels-per-line" is specified. The coding attribute "number-of-lines" may also be specified. No restriction is placed on the values that may be specified for these coding attributes. This profile places no constraints on the size of the pel arrays that may be used as long as the size does not exceed the page dimension size.~~

The type of coding method used is specified by the attribute "Type-of-coding". The use of this attribute is mandatory in the Document-architecture-defaults of the document profile to define the default value of either T.6 encoding (untiled) or Tiled encoding. The use of this attribute in the description of the content portions is non-mandatory. If this attribute is not specified for a particular content portion, then the default value specified in the Document-architecture-defaults of the document profile is used.

If the Tiled encoding method is used, the default value of 512 for the "Number-of-pels-per-tile-line" and "Number-of-lines-per-tile" must be used. No other values are supported, therefore these two attributes do not need to be specified. If the "Tile-types" attribute is not present, then all tiles will be T.6 encoded. If it is present, then there must be a value specified for each tile in which case only null background, null foreground, T.6 encoded, or bitmap encoded values are supported. T.4 one dimensional and T.4 two dimensional encodings are not supported. There are no restrictions on the use of the Tiling-offset other than that specified in ISO 8613-7 Addendum.

See table D.1, Annex D, for a tabulated list of the attributes and their basic, default, and non-basic values.

6.5.1.4 Raster Presentation

Raster presentation is controlled by the presentation attributes specified in ISO 8613-7. This DAP provides for additional constraints on these presentation attributes as specified below.

The basic Pel-path values supported by this profile are 0 and 90 degrees. The Pel-path values of 180 and 270 degrees are non-basic.

The basic Line-progression value supported by this profile is 270 degrees. The Line-progression value of 90 degrees is non-basic.

~~The basic Pel spacing values supported by this profile are the ratios equal to 6 and 4 BMUs between adjacent pels. This corresponds to equivalent resolutions of 200 and 300 pels per 25.4 mm (1 in.), respectively when the BMU is interpreted as 1/1200 inch. Values for Pel spacing other than these ratios are non basic, i.e., 5, 3, 2, and 1 BMU. These correspond to equivalent resolutions of 240, 400, 600, and 1200 pels per 25.4 mm (1 in.).~~

Any value may be explicitly specified for pel spacing provided that the spacing between pels is not less than 1 BMU. The pel spacing need not be an integer value. The value of 'null' may not be specified because the scalable layout process is not supported. The specification of the spacings of 16, 12, 8, 6, 5, 4, 3, 2, and 1 BMU between adjacent pels are basic. The specification of any other spacing is non-basic and must be specified in the document profile.

NOTES

1 The basic pel spacing values listed above are equivalent to resolutions of 75, 100, 150, 200, 240, 300, 400, 600, and 1200 pels per 25.4mm respectively when the BMU is interpreted as 1/1200 inch.

2 The attribute "pel spacing" specifies two integers, the ratio of which determines the pel spacing. No restriction is placed on the values of these integers.

There are no restrictions on the use of the Clipping attribute. The Image-dimensions attribute is not supported.

There are no restrictions placed on the value of the Spacing-ratio providing that the resultant line spacing is not less than 1 BMU. Also, the line spacing need not be an integral number of BMUs. All values are basic.

See table D.2, Annex D, for a tabulated list of the attributes and their basic, default, and non-basic values.

6.5.2 Character Content

The formatted character content is permitted in this DAP for use in either the original image or in revision annotations of that original image.

The specification in a document of a non-basic feature by a presentation attribute or control function must be indicated in the document profile.

6.5.2.1 Character Content Architecture Class

When using character content, only one content portion may be associated with a basic component. The content information in a content portion must be present.

6.5.2.2 Character Repertoires

The basic character set supported by this profile is the primary character set of ISO 8859-1. This must be designated to the G0 set and invoked to the GL. Any other graphic character set which is registered in accordance with ISO 2375 may be designated and invoked at any point in the document provided its use is announced in the document profile as a non-basic value using the character presentation attribute *Graphic character sets*. No locking shift functions are specified in this presentation attribute. The default graphic character sets which apply to the content portions within a document can be specified in the document profile using the presentation attribute *graphic character sets*.

Using code extension techniques, the graphic character sets designated and/or invoked at the beginning of a content portion containing character content are specified using the presentation attribute *graphics character sets*.

If the character set defined in ISO 6937-2 is designated and invoked, then the use of any sub-repertoire registered according to ISO 7350 may be specified. All sub-repertoires are non-basic and their use must be indicated in the document profile.

6.5.2.3 Code Extension Techniques

The code extension techniques specified in ISO 2022 may be used subject to the following restrictions:

- a) G0 set: only the primary character sets of ISO 6937-2, ISO 8859-X (where ISO 8859-X corresponds to any finalized part of ISO 8859) and a version of ISO 646 may be designated for this set; these character sets may only be invoked in GL;
- b) G1, G2, G3 sets: no restrictions are placed on the character sets that may be designated for these sets; these sets may only be invoked in GR;
- c) The locking and single shift functions allowed should be restricted to the following:
 - LS0 for the G0 set
 - LS1R for the G1 set
 - LS2R for the G2 set
 - LS3R for the G3 set
 - SS2
 - SS3;
- d) When specifying the presentation attribute *Graphic character sets*, it is necessary to invoke character sets for both GL and GR. Thus an allowed character set must be designated into G0, as specified above, and invoked into GR. It is also necessary to invoke a character set into GR which has been designated into G1, G2 or G3 sets;

- e) The empty set should be designated and invoked in GR if no other specific set is invoked into GR.

The announcement and encoding of these functions are to be as specified in ISO 2022.

6.5.2.4 Line Spacing

Any value of line spacing may be specified. Values of 150, 200, 300 and 400 BMUs are basic; the use of any other value in a document is non-basic and must be indicated in the document profile. The line spacing may be specified at the beginning of the content associated with a basic component using the presentation attribute "Line spacing". The value may be changed anywhere within the content portion using the control functions SVS and SLS.

6.5.2.5 Character Spacing

Any value of character spacing may be specified. Values greater than or equal to 100 are basic; the use of any other value in a document is non-basic and must be indicated in the document profile. The character spacing may be specified at the beginning of the content associated with a basic component using the attribute "Character spacing". The value may be changed anywhere within a content portion using the control functions SHS or SCS.

6.5.2.6 Character Path and Line Progression

Both horizontal and vertical writing directions may be used within a character content. In the case of horizontal writing, the characters progress either from left to right or from right to left across the page and the line progression is from the top of the page to the bottom. In the case of vertical writing, the characters progress from the top of the page to the bottom and the line progression is from the right to the left. The values of character path and line progression may be specified at the beginning of the content associated with a basic component using the presentation attributes *Character path* and *Line progression*, respectively. These values cannot be changed within a content portion.

6.5.2.7 Character Orientation

The character orientation may be specified as 0 or 90 degrees depending on whether vertical or horizontal writing is used. When vertical writing is used, characters are normally orientated at 0 degrees. When horizontal writing is used, characters may be orientated at 0 or 90 degrees. A value of 0 degrees is basic; a value of 90 degrees is non-basic and its use in a document must be indicated in the document profile. The value of the character orientation is specified at the beginning of the content associated with a basic component by the presentation attribute *Character orientation*. This value cannot be changed within the content.

6.5.2.8 Emphasis

The following modes of emphasising graphic characters may be distinguished:

- a) normal rendition;
- b) normal intensity;
- c) increased intensity (bold);
- d) italicised;
- e) not italicised;
- f) underlined;
- g) doubly underlined;
- h) not underlined;
- i) crossed-out;
- j) not crossed-out.

All the above modes of emphasis are basic. If no default mode is explicitly specified in the document profile, then the default mode is normal rendition. The mode of emphasis may be specified at the beginning of the content associated with a basic component using the presentation attribute *Graphic rendition*. The mode may be changed anywhere within the content using the control function SGR. The mode of emphasis remains in effect within the content associated with a basic component until changed into a mutually exclusive mode or by the specification of *normal rendition*. Mutually exclusive modes are normal/increased intensity, italicized/not italicized, underlined/not underlined and crossed out/not crossed-out. One mode from each mutually exclusive set may be in operation at any point in the document content. Normal rendition cancels the effect of all methods of emphasis that are currently in operation and specifies that the text should be displayed in accordance with the default rendition parameters set for the presentation device. Thus, for example, if it is required to ensure that the content is not underlined, then it is necessary to explicitly specify that underlined is not to be used.

6.5.2.9 Tabulation

Tabulation stop positions may be specified at any character position along the character path. Each stop is specified by means of the following:

- a) The tabulation position relative to the margin position in the direction opposite to the character path;
- b) An alignment qualifier that specifies the type of alignment to be used at the designated tabulation position. The type may be specified as one of the following:

- start aligned;
- end aligned;
- centered;
- aligned around.

These alignment qualifiers are defined in ISO 8613-6. If the alignment qualifier is not explicitly specified, then it is assumed that start aligned is to be used. Only one set of tabulation stops can be specified to be applicable to the content associated with a basic component. No limit is placed on the number of tabulation stops that can be specified within a given set. The set of tabulation stop positions associated with the content of a basic component are specified using the presentation attribute *Line layout table*. Tabulation stop positions are invoked within the content using the control function STAB.

6.5.2.10 Alignment

This feature is concerned with how the first and last characters on each line of character content is to be laid out during the formatting process. The following values of alignment may be specified:

- a) start aligned;
- b) end aligned;
- c) centred;
- d) justified.

The semantics of these values are as defined in ISO 8613-6. The presentation attribute *Alignment* is used to specify the alignment that is applicable to the content associated with a basic component. The alignment value cannot be changed within a content portion.

6.5.2.11 Fonts

Any number of fonts may be used within a document. The fonts used in a particular document are specified in the document profile using the attribute *Font list*. Further information concerning the specification of font references in the document profile is given in Annex B. The fonts that may be used within the content associated with each basic component are specified by the presentation attribute *Character fonts*. Up to 10 fonts taken from the list specified by the attribute *Font list* may be specified by the attribute *Character fonts*. The font to be used at the start of the content associated with a basic component is specified using the attribute *Graphic rendition*. The fonts used within the content may be changed using the control function SGR.

6.5.2.12 Reverse Character Strings

Bi-directional writing is supported by this profile. Hence, a string of characters in a content portion associated with a basic component may be specified to be imaged in the reverse direction of the immediately preceding character string. Such strings can be specified by the control function *SRS* as defined in ISO 8613-6. This control function is provided for cases in which the text belongs to different languages and the character content is written, for example, from left to right or from right to left within the same line of characters, dependent upon the language and/or character set being used.

NOTE - The use of this control function cannot be indicated in the document profile. Thus it is intended that implementations should ignore this control function when reverse character string layout and presentation is not supported.

6.5.2.13 Superscripts and Subscripts

Superscripts and subscripts may be specified anywhere within the content associated with a basic component by using the control functions *PLU* and *PLD*. The use of these control functions shall be in accordance with ISO 8613-6.

6.5.2.14 Substitution of Characters

The control function *SUB* is provided to represent characters produced by a local system that cannot be represented by a character within a character set supported by this profile.

6.5.2.15 Use of Control Functions

The following is a list of all the control functions and parameter values (where applicable) that may be specified in character content:

- a) SHS - set horizontal spacing;
- b) SCS - set character spacing;
- c) SVS - set vertical spacing;
- d) SLS - set line spacing;
- e) SGR - set graphic rendition;
- f) STAB - selective tabulation (allowed parameter values: any);
- g) SRS - start reverse string (allowed parameters: any);
- h) PLD - partial line down;
- i) PLU - partial line up;

- j) SUB - substitute character;
- k) SP - space;
- l) CR - carriage return;
- m) LF - line feed;
- n) - code extension control functions ~~(see 6.5.4.3)~~.

6.5.3 Geometric Graphics Content

The formatted processable graphics content is permitted in this DAP for use in either the original image or in the revision annotation of that image. Such geometric graphics content is encoded as CGM (Computer Graphics Metafile) metafiles in accordance with ISO 8632 and ISO 8613-8. Each CGM figure must consist of a single picture only.

Further information concerning the specification of geometric graphics content information is given in Annex B.

6.6 Miscellaneous Features

6.6.1 Resource Documents

A GenericBlock may refer to a corresponding constituent in a resource document. The GenericBlock in the resource document may refer to content portions and to presentation styles that are contained within the resource document. These are the only constituents that may appear in a resource document.

6.6.2 Application Comments

Specification of the attribute Application-comments is optional. When used in conjunction with the Type-of-coding of 'Tiled', it contains a sequence of positive integers, one for each tile in the content portion. The sequence of integers is a set of indices representing the octet offsets to the beginning of the respective tiles, starting from the beginning of the "content-information". A tile index of zero(0) indicates that the respective tile is null. The integers will be sequenced in the same order as the tiles. The tiles will be sequenced primarily in the Pel-path and secondarily in the Line-progression direction as defined by the presentation attributes.

6.7 Document Management Features

Every document interchanged in accordance with this DAP must include a document profile containing information which relates to the document as a whole.

The features specified by the document profile are listed below. A definition of the information contained in these features is given in the corresponding attribute definitions in ISO 8613-4.

Document constituent information:

- a) specific layout structure;
- b) generic layout structure;
- c) presentation styles (optional);
- d) resource document information (optional).

Document characteristics:

- a) document application profile;
- b) document application profile defaults;
- c) document architecture class;
- d) content architecture class;
- e) interchange format class;
- f) ODA version date;
- g) raster graphics content defaults.

Non-basic document characteristics:

- a) page dimensions;
- b) medium type;
- c) raster graphics presentation features.

Document management attributes:

- a) document description (see note 1);
- b) dates and times;
- c) originators;

- d) other user information;
- e) external references;
- f) local file references;
- g) content attributes;
- h) security information.

NOTE - The document description includes the specification of the document reference.

The attributes applicable to the document profile are defined in table D.3, Annex D.

7 Specification of Constituent Constraints

7.1 Document Profile Constraints

7.1.1 Macro Definitions

-- General macros --

DEFINE(FDA, "{ 'formatted' }")

DEFINE(DAC, "DocumentProfile (Document-architecture-class)")

DEFINE(FC, "ASN.1{2 8 2 6 0}") -- Character formatted --

DEFINE(FPR, "ASN.1{2 8 2 7 2}") -- Raster graphics formatted processable --

DEFINE(FPG, "ASN.1{2 8 2 8 0}") -- Geometric graphics formatted processable --

-- Basic page dimensions. --

DEFINE(BasicPageDimension, "

{REQ #horizontal-dimension {REQ #fixed-dimension { <=40800-1..9240 }},

REQ #vertical-dimension {REQ #fixed-dimension { <=52800-1..12400 }}}

~~Any size equal to or smaller than the actual page size of ISO A1 and ANSI E portrait.~~

| {REQ #horizontal-dimension {REQ #fixed-dimension { <=52800-1..12400 }},

REQ #vertical-dimension {REQ #fixed-dimension { <=40800-1..9240 }}}

~~Any size equal to or smaller than the actual page size of ISO A1 and ANSI E landscape.~~

")

-- Any size equal to or smaller than CARA (Common Assured Reproduction Area) of ISO A4 and NA A. Both Portrait and Landscape may be specified. --

-- Non-basic page dimensions. --

DEFINE(NonBasicPageDimensions, "

{REQ #horizontal-dimension {REQ #fixed-dimension {40801..48000}}},

REQ #vertical-dimension {REQ #fixed-dimension {52801..211200}}}

— Any size larger than the range of basic values in ANSI E portrait and equal to or smaller than the full size of ANSI K portrait. —

+ {REQ #horizontal-dimension {REQ #fixed-dimension {52801..211200}}},

REQ #vertical-dimension {REQ #fixed-dimension {40801..48000}}}

— Any size larger than the range of basic values in ANSI E landscape and equal to or smaller than the full size of ANSI K landscape. —

+ {REQ #horizontal-dimension {REQ #fixed-dimension {13200}},

REQ #vertical-dimension {REQ #fixed-dimension {>= 16801}}}

— Any portrait size larger than the typical foldout size (11 in x 14 in) including 11 inch roll paper. —

+ {REQ #horizontal-dimension {REQ #fixed-dimension {>= 16801}},

REQ #vertical-dimension {REQ #fixed-dimension {13200}}}

— Any landscape size larger than the typical foldout size (14 in x 11 in) including 11 inch roll paper. —

→

DEFINE(NonBasicPageDimensions:

{REQ #horizontal-dimension {REQ #fixed-dimension {1..39680}},

REQ #vertical-dimension {REQ #fixed-dimension {12401..56120}}}

| {REQ #horizontal-dimension {REQ #fixed-dimension {9241..39680}},

REQ #vertical-dimension {REQ #fixed-dimension {1..56120}}}

— up to ISO A0 portrait —

| {REQ #horizontal-dimension {REQ #fixed-dimension {1..56120}},

REQ #vertical-dimension {REQ #fixed-dimension {9241..39680}}}

| {REQ #horizontal-dimension {REQ #fixed-dimension {12401..56120}},

REQ #vertical-dimension {REQ #fixed-dimension {1..39680}}}

— up to ISO A0 landscape —

| {REQ #horizontal-dimension {REQ #fixed-dimension {1..48000}},

REQ #vertical-dimension {REQ #fixed-dimension {12401..211200}}}

| {REQ #horizontal-dimension {REQ #fixed-dimension {9241..48000}},

REQ #vertical-dimension {REQ #fixed-dimension {1..211200}}}

— up to ANSI J/K portrait —

| {REQ #horizontal-dimension {REQ #fixed-dimension {1..211200}},

REQ #vertical-dimension {REQ #fixed-dimension {9241..48000}}}

| {REQ #horizontal-dimension {REQ #fixed-dimension {12401..211200}},

REQ #vertical-dimension {REQ #fixed-dimension {1..48000}}}

— up to ANSI J/K landscape —

| {REQ #horizontal-dimension {REQ #fixed-dimension {1..12141}},

REQ #vertical-dimension {REQ #fixed-dimension {12401..17196}}}

| {REQ #horizontal-dimension {REQ #fixed-dimension {9241..12141}},

REQ #vertical-dimension {REQ #fixed-dimension {1..17196}}}

— up to Japanese legal portrait —

| {REQ #horizontal-dimension {REQ #fixed-dimension {1..17196}},

REQ #vertical-dimension {REQ #fixed-dimension {9241..12141}}}

| {REQ #horizontal-dimension {REQ #fixed-dimension {12401..17196}},

REQ #vertical-dimension {REQ #fixed-dimension {1..12141}}}

— up to Japanese legal landscape —

| {REQ #horizontal-dimension {REQ #fixed-dimension {13200}},

REQ #vertical-dimension {REQ #fixed-dimension {>= 16801}}}

— Any portrait size larger than the typical foldout size (11 in x 14 in) including 11 inch roll paper. —

| {REQ #horizontal-dimension {REQ #fixed-dimension {>= 16801}},

```
REQ #vertical-dimension {REQ #fixed-dimension {13200}}
-- Any landscape size larger than the typical foldout size (14 in x 11 in) including 11 inch roll paper --
)
```

```
DEFINE(PermissiblePageDimensions,"
```

```
{REQ #horizontal-dimension {REQ #fixed-dimension {1..39680}},
REQ #vertical-dimension {REQ #fixed-dimension {1..56120}}}
-- up to ISO A0 portrait --
| {REQ #horizontal-dimension {REQ #fixed-dimension {1..56120}},
REQ #vertical-dimension {REQ #fixed-dimension {1..39680}}}
-- up to ISO A0 landscape --
| {REQ #horizontal-dimension {REQ #fixed-dimension {1..48000}},
REQ #vertical-dimension {REQ #fixed-dimension {1..211200}}}
-- up to ANSI J/K portrait --
| {REQ #horizontal-dimension {REQ #fixed-dimension {1..211200}},
REQ #vertical-dimension {REQ #fixed-dimension {1..48000}}}
-- up to ANSI J/K landscape --
| {REQ #horizontal-dimension {REQ #fixed-dimension {1..12141}},
REQ #vertical-dimension {REQ #fixed-dimension {1..17196}}}
-- up to Japanese legal portrait --
| {REQ #horizontal-dimension {REQ #fixed-dimension {1..17196}},
REQ #vertical-dimension {REQ #fixed-dimension {1..12141}}}
-- up to Japanese legal landscape --
```

```
)
```

```
DEFINE(NominalPageSizes,"
```

```
-- ISO Page Sizes --
```

```
{REQ #horizontal-dimension {7015}, REQ #vertical-dimension {9920}
-- ISO A5 Portrait -- }
| {REQ #horizontal-dimension {9920}, REQ #vertical-dimension {7015}
-- ISO A5 Landscape -- }
| {REQ #horizontal-dimension {9920}, REQ #vertical-dimension {14030}
-- ISO A4 Portrait -- }
| {REQ #horizontal-dimension {14030}, REQ #vertical-dimension {9920}
-- ISO A4 Landscape -- }
| {REQ #horizontal-dimension {14030}, REQ #vertical-dimension {198430}
-- ISO A3 Portrait -- }
| {REQ #horizontal-dimension {198430}, REQ #vertical-dimension {14030}
-- ISO A3 Landscape -- }
| {REQ #horizontal-dimension {198430}, REQ #vertical-dimension {280630}
-- ISO A2 Portrait -- }
| {REQ #horizontal-dimension {280630}, REQ #vertical-dimension {198430}
-- ISO A2 Landscape -- }
| {REQ #horizontal-dimension {280630}, REQ #vertical-dimension {39732680}
-- ISO A1 Portrait -- }
| {REQ #horizontal-dimension {39732680}, REQ #vertical-dimension {280630}
-- ISO A1 Landscape -- }
| {REQ #horizontal-dimension {39732680}, REQ #vertical-dimension {56173120}}
```



```

-- ISO A0 Portrait -- }
| {REQ #horizontal-dimension {56473120}, REQ #vertical-dimension {39732680}
-- ISO A0 Landscape -- }

```

-- ANSI Page Sizes --

```

| {REQ #horizontal-dimension {10200}, REQ #vertical-dimension {13200}
-- ANSI A Portrait -- }
| {REQ #horizontal-dimension {13200}, REQ #vertical-dimension {10200}
-- ANSI A Landscape -- }
| {REQ #horizontal-dimension {10200}, REQ #vertical-dimension {16800}
-- ANSI Legal Portrait -- }
| {REQ #horizontal-dimension {16800}, REQ #vertical-dimension {10200}
-- ANSI Legal Landscape -- }
| {REQ #horizontal-dimension {13200}, REQ #vertical-dimension {20400}
-- ANSI B Portrait -- }
| {REQ #horizontal-dimension {20400}, REQ #vertical-dimension {13200}
-- ANSI B Landscape -- }
| {REQ #horizontal-dimension {20400}, REQ #vertical-dimension {26400}
-- ANSI C Portrait -- }
| {REQ #horizontal-dimension {26400}, REQ #vertical-dimension {20400}
-- ANSI C Landscape -- }
| {REQ #horizontal-dimension {26400}, REQ #vertical-dimension {40800}
-- ANSI D Portrait -- }
| {REQ #horizontal-dimension {40800}, REQ #vertical-dimension {26400}
-- ANSI D Landscape -- }
| {REQ #horizontal-dimension {40800}, REQ #vertical-dimension {52800}
-- ANSI E Portrait -- }
| {REQ #horizontal-dimension {52800}, REQ #vertical-dimension {40800}
-- ANSI E Landscape -- }
| {REQ #horizontal-dimension {33600}, REQ #vertical-dimension {48000}
-- ANSI F Portrait -- }
| {REQ #horizontal-dimension {48000}, REQ #vertical-dimension {33600}
-- ANSI F Landscape -- }
| {REQ #horizontal-dimension {13200}, REQ #vertical-dimension {108000}
-- ANSI G Portrait -- }
| {REQ #horizontal-dimension {108000}, REQ #vertical-dimension {13200}
-- ANSI G Landscape -- }
| {REQ #horizontal-dimension {33600}, REQ #vertical-dimension {171600}
-- ANSI H Portrait -- }
| {REQ #horizontal-dimension {171600}, REQ #vertical-dimension {33600}
-- ANSI H Landscape -- }
| {REQ #horizontal-dimension {40800}, REQ #vertical-dimension {211200}
-- ANSI J Portrait -- }
| {REQ #horizontal-dimension {211200}, REQ #vertical-dimension {40800}
-- ANSI J Landscape -- }
| {REQ #horizontal-dimension {48000}, REQ #vertical-dimension {171600}
-- ANSI K Portrait -- }
| {REQ #horizontal-dimension {171600}, REQ #vertical-dimension {48000}

```

-- ANSI K Landscape -- }

-- Foldouts --

| {REQ #horizontal-dimension {13200}, REQ #vertical-dimension {16800}}

-- Foldout Portrait -- }

| {REQ #horizontal-dimension {16800}, REQ #vertical-dimension {13200}}

-- Foldout Landscape -- }

| {REQ #horizontal-dimension {13200}, REQ #vertical-dimension {> = 16801}}

-- Any portrait size larger than the typical foldout size (11 in x 14 in) including 11 inch roll paper --

| {REQ #horizontal-dimension {> = 16801}, REQ #vertical-dimension {13200}}

-- Any landscape size larger than the typical foldout size (14 in x 11 in) including 11 inch roll paper --

")

-- Macro defining permissible code extension announcers --

DEFINE(CDEXTEN, " ESC 02/00 05/00, -- LS0 --

[ESC 02/00 05/03], -- LSR1 --

[ESC 02/00 05/05], -- LSR2 --

[ESC 02/00 05/07], -- LSR3 --

[ESC 02/00 05/10], -- SS2 --

[ESC 02/00 05/11] -- SS3 --

")

-- Macro defining permitted graphic renditions --

DEFINE(GRAPHICRENDITIONS "

{ 'cancel' | 'increased-intensity'

| 'italicised' | 'underlined' | 'crossed-out'

| 'primary-font' | 'first-alternative-font'

| 'second-alternative-font' | 'third-alternative-font'

| 'fourth-alternative-font' | 'fifth-alternative-font'

| 'sixth-alternative-font' | 'seventh-alternative-font'

| 'eighth-alternative-font' | 'ninth-alternative-font'

| 'doubly-underlined' | 'normal-intensity'

| 'not-italicised' | 'not-underlined' | 'not-crossed-out'}...

")

-- Macros defining final character for designation --

DEFINE(FCORE, "04/02 -- the 94 characters of the IRV of ISO 646
(revised 1990) (i.e., ASCII) --")

DEFINE(F646, "-- a final character designating any version of ISO 646
except 04/02 --")

DEFINE(F94S, "-- a final character designating any registered 94 single

byte graphic character set --")

DEFINE(F94M, "-- a final character designating any registered 94 multi
byte graphic character set --")

DEFINE(F96S, "-- a final character designating any registered 96 single
byte graphic character set --")

DEFINE(F96M, "-- a final character designating any registered 96 multi
byte graphic character set --")

DEFINE(FEMPTY, "07/14 -- the empty set --")

-- Macros defining designation sequences --

DEFINE(DEG-CORE-GO, "ESC 02/08 \$FCORE")
-- Designate the 94 characters of the IRV of
ISO 646 to G0 --

DEFINE(DEG-646-GO, "ESC 02/08 \$F646")
-- Designate any version of ISO 646, except 04/02,
to G0 --

DEFINE(DEG-ANY-G1, "{ESC 02/09 \$F94S
|ESC 02/04 02/09 \$F94M
|ESC 02/13 \$F96S
|ESC 02/04 02/13 \$F96M}")
-- Designate any character set to G1 --

DEFINE(DEG-ANY-G2, "{ESC 02/10 \$F94S
|ESC 02/04 02/10 \$F94M
|ESC 02/14 \$F96S
|ESC 02/04 02/14 \$F96M}")
-- Designate any character set to G2 --

DEFINE(DEG-ANY-G3, "{ESC 02/11 \$F94S
|ESC 02/04 02/11 \$F94M
|ESC 02/15 \$F96S
|ESC 02/04 02/15 \$F96M}")
-- Designate any character set to G3 --

DEFINE(DEG-EMPTY-G1, "ESC 02/09 \$FEMPTY")
-- Designate the empty set to G1 --

-- Macros defining shift functions --

DEFINE(LSO, "00/15") -- locking shift invoking G0 to GL --

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DEFINE(LS1R, "ESC 07/14") -- locking shift invoking G1 to GR --

DEFINE(LS2R, "ESC 07/13") -- locking shift invoking G2 to GR --

DEFINE(LS3R, "ESC 07/14") -- locking shift invoking G3 to GR --

DEFINE(SS2, "08/14") -- single shift invoking G2 to GL --

DEFINE(SS3, "08/15") -- single shift invoking G3 to GL --

-- Macro defining permissible graphic character sets. --

```
DEFINE(PERMIT-GRCHAR, " {$DEG-CORE-G0 $LS0
    |$DEG-646-G0 $LS0},
    {$DEG-ANY-G1 $LS1R
    |$DEG-ANY-G2 $LS2R
    |$DEG-ANY-G3 $LS3R}...
    |{$DEG-EMPTY-G1 $LS1R} ")
```

-- Macro defining default graphic character sets --

DEFINE(DAP-DEFAULT-GRCHAR, "\$PERMIT-GRCHAR")

-- Macro defining basic character sets. Note that this macro is defined for clarification of the specification and is not to be used in any other part of this DAP specification. --

```
DEFINE(BASIC-GRCHAR, " $DEG-CORE-G0 $LS0,
    $DEG-EMPTY-G1 $LS1R ")
```

-- Macro defining non-basic character sets --

```
DEFINE(NON-BASIC-GRCHAR, " {$DEG-646-G0
    |$DEG-ANY-G1
    |$DEG-ANY-G2
    |$DEG-ANY-G3}... ")
```

-- Macro defining character sets used in document profile attributes --

```
DEFINE(PROFCHAR, " {$DEG-CORE-G0 $LS0,
    |$DEG-646-G0 $LS0},
    {$DEG-ANY-G1 $LS1R
    |$DEG-ANY-G2 $LS2R
    |$DEG-ANY-G3 $LS3R
    |$DEG-EMPTY-G1 $LS1R} ")
```

-- Macro defining comments character sets --

```
DEFINE(COMCHAR, " {ESC 02/00 05/00,      -- LS0 --
                [ESC 02/00 05/03],      -- LSR1 --
                [ESC 02/00 05/05],      -- LSR2 --
                [ESC 02/00 05/07],      -- LSR3 --
                [ESC 02/00 05/10],      -- SS2 --
                [ESC 02/00 05/11]},      -- SS3 --
                {$DEG-CORE-G0 [LS0]
                |$DEG-646-G0 [LS0]},
                {{$DEG-ANY-G1 [$LS1R]
                |$DEG-ANY-G2 [$LS2R]
                |$DEG-ANY-G3 [$LS3R]}...
                |$DEG-EMPTY-G1 [$LS1R]} } ")
```

-- Macro defining character sets used for alternative representation --

```
DEFINE(ALTCHAR, "$PROFCHAR")
```

7.1.2 Constituent Constraints

7.1.2.1 DocumentProfile

{

-- Presence of document constituents --

REQ	Specific-layout-structure	{'present'},
PERM	Generic-layout-structure	{'factor-set'},
PERM	Presentation-styles	{'present'},
PERM	Resource-document	{ANY_VALUE},
PERM	Resources	{MUL {REQ #resource-identifier {ANY_VALUE},
		REQ #resource-object-class-identifier {ANY_VALUE}}},

-- Document characteristics --

REQ	Document-application-profile	{-- See clause 8 for a definition of the permitted values for this attribute. --},
-----	------------------------------	--

REQ	Document-application-profile-defaults	{
-----	---------------------------------------	---

-- Document architecture defaults --

REQ	#content-architecture-class	{\$FPR},
PERM	#dimensions	{\$BasicPageDimensions+}

PERM #medium-type {NonBasicPageDimensions, PermissiblePageDimensions},
 PERM #nominal-page-size {\$NominalPageSizes},
 PERM #side-of-sheet {ANY_VALUE}},

-- Any permitted medium type. Both landscape and portrait may be specified. --

REQ #type-of-coding {ASN.1 {2 8 3 7 0} -- T6 encoding --
 | ASN.1 {2 8 3 7 5} -- tiled encoding -- },
 PERM #page-position {ANY_VALUE},
 PERM raster-graphics-contents-defaults {
 PERM #pel-path {ANY_VALUE},
 PERM #line-progression {ANY_VALUE},
 PERM #pel-spacing {REQ #length {6+4ANY_VALUE},
 REQ #pel-spaces {1ANY_VALUE}},
 PERM #spacing-ratio
 {REQ #line-spacing-value {ANY_VALUE},
 REQ #pel-spacing-value {ANY_VALUE}},
 PERM #compression {'compressed' | 'uncompressed' ANY_VALUE},
 PERM #clipping {ANY_VALUE}},
 PERM #geometric-graphics-content-defaults {ANY_VALUE},
 PERM #character-content-defaults {
 PERM #alignment {ANY_VALUE},
 PERM #character-spacing {ANY_VALUE},
 PERM #character-fonts {ANY_VALUE},
 PERM #character-orientation {'0-degrees' | '90-degrees'},
 PERM #character-path {'0-degrees' | '90-degrees' | '180-degrees' |
 '270-degrees'},
 PERM #code-extension-announcers {\$CDEXTANCDEXTEN},
 PERM #graphic-character-sets {\$PERMIT-GRCHAR},
 PERM #graphic-character-subrepertoire {\$GRAPHICRENDITIONSANY_VALUE},
 PERM #graphic-rendition {\$GRAPHICRENDITIONS},
 PERM #line-progression {'90-degrees' | '270-degrees'},
 PERM #line-spacing {ANY_VALUE},
 PERM #line-layout-table {ANY_VALUE}},

-- End of document architecture defaults --

REQ Document-architecture-class {\$FDA},
 REQ Content-architecture-classes {{\$FPR}, {\$FPG}, {\$FC}, {\$FPR | \$FPG | \$FC} ..},
 REQ Interchange-format-class {-- This attribute required only for ODIF interchange. See
 clause 8 for a definition of the permitted values for this
 attribute. --},

REQ ODA-version

{REQ #standard-or-recommendation {'ISO 8613'},
 REQ #publication-date {'1989-07-04' | '1991-12-31'}},
 -- This date represents the date that this DAP was approved. This is the only
 -- approved value, however, the date will be changed if the DAP is significantly

-- revised. If the date is revised, use of the new date is required only when the
 -- additional functionality is being used. That is, legacy products may continue to
 -- support the earlier DAP.

-- Non-basic document characteristics --

```

PERM Profile-character-sets          {$PROFCHAR},
PERM Comments-character-sets        {$COMCHAR},
PERM Alternative-representation-character-sets {$ALTCHAR},
PERM Page-dimensions                {PMUL {$NonBasicPageDimensions}},
PERM Medium-types                   {PMUL{
  PERM #nominal-page-size          {$NominalPageSizes},
  PERM #side-of-sheet              {ANY_VALUE}}},
  -- All values of "medium type" are non-basic --
PERM Coding-attributes              {
  REQ #raster-graphics-coding-attributes {
    REQ #compression {'uncompressed'}}},
PERM Presentation-features          {
  PERM #character-presentation-features { MUL {
    | PERM #character-orientation {'90-degrees'},
    PMUL | PERM #character-path {'90-degrees', '180-degrees',
    '270-degrees'},
    PMUL | PERM #graphic-character-sets {ANY_VALUE} EXCEPT {$BASIC-GRCHAR},
    PMUL | PERM #graphic-character-subrepertoire {ANY_VALUE>0},
    PMUL | PERM #line-spacing {ANY_VALUE} EXCEPT {150,200,300,400},
    | PERM #line-progression {'90-degrees'}}},
  PERM #Raster-graphics-presentation-features { MUL {
    PMUL | PERM #pel-path {'180-degrees' |
    '270-degrees'},
    | PERM #line-progression {'90-degrees'},
    PMUL | PERM #pel-spacing {REQ #length {ANY_VALUE} EXCEPT 6,
    4{16,12,8,6,5,4,3,2,1}},
    REQ #pel-spaces {ANY_VALUE} EXCEPT {1}},
    PMUL | PERM #spacing-ratio
    {REQ #line-spacing-value {ANY_VALUE} EXCEPT {1},
    REQ #pel-spacing-value {ANY_VALUE} EXCEPT {1}}}}},

```

-- End of Non-basic characteristics --

-- Additional document characteristics --

```

PERM Fonts-list {PMUL {REQ #font-identifier {ANY_VALUE},
  REQ #font-reference {ANY_VALUE}}},

```

-- The format of the parameter "font-reference" is defined in annex B --

-- Document management attributes --

-- Document description --

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```

PERM  Title                               {ANY_STRING},
PERM  Subject                             {ANY_STRING},
PERM  Document-type                       {ANY_STRING},
PERM  Abstract                            {ANY_STRING},
PERM  Keywords                            {ANY_VALUE},
REQ   Document-reference                  {ANY_VALUE},

    -- Dates and times --
PERM  Document-date-and-time              {ANY_STRING},
PERM  Creation-date-and-time              {ANY_STRING},
PERM  Local-filing-date-and-time          {ANY_STRING},
PERM  Expiry-date-and-time                {ANY_STRING},
PERM  Start-date-and-time                 {ANY_STRING},
PERM  Purge-date-and-time                 {ANY_STRING},
PERM  Release-date-and-time               {ANY_STRING},
PERM  Revision-history                    {ANY_VALUE},

    --Originators --
PERM  Organizations                       {ANY_STRING},
PERM  Preparers                           {ANY_VALUE},
PERM  Owners                              {ANY_VALUE},
PERM  Authors                             {ANY_VALUE},

    -- Other user information --
PERM  Copyright                           {ANY_VALUE},
PERM  Status                              {ANY_STRING},
PERM  User-specific-codes                  {ANY_STRING},
PERM  Distribution-list                    {ANY_VALUE},
PERM  Additional-information               {ANY_VALUE},

    -- External references --
PERM  References-to-other-documents        {ANY_VALUE},
PERM  Superseded-documents                 {ANY_VALUE},

    -- Local file references --
PERM  Local-file-references                {ANY_VALUE},

    -- Content attributes --
PERM  Document-size                        {ANY_INTEGERVALUE},
PERM  Number-of-pages                      {ANY_INTEGER},
PERM  Languages                            {ANY_STRING},

    -- Security information --
PERM  Authorization                       {ANY_VALUE},
PERM  Security-classification               {ANY_STRING},
PERM  Access-rights                        {ANY_STRING}
}
```

7.2 Logical Constituent Constraints

No logical constituents applicable in this clause.

7.3 Layout Constituent Constraints

7.3.1 Macro Definitions

```

DEFINE(CHAR,"      CONTENT_ID_OF(CHARACTERCharacter-content-portion)")
DEFINE(RAST,"      CONTENT_ID_OF(RASTERRaster-graphics-content-portion)")
DEFINE(GEOM,"      CONTENT_ID_OF(GEOMETRICGeometric-graphics-content-portion)")

```

7.3.2 Factor Constraints

```

FACTOR:      ANY-LAYOUT      {

SPECIFIC:
PERM  Object-type      {VIRTUAL},
REQ   Object-identifier {ANY_VALUE},
PERM  Subordinates     {VIRTUAL},
PERM  User-visible-name {ANY_VALUE},
PERM  User-readable-comments {ANY_VALUE},
}

```

7.3.3 Constituent Constraints

7.3.3.1 DocumentLayoutRoot

```

DocumentLayoutRoot: ANY-LAYOUT {

SPECIFIC:
REQ   Object-type      { 'document-layout-root' },
REQ   Subordinates     {SUB_ID_OF(CompositePage) + }
}

```

7.3.3.2 CompositePage

```

CompositePage:      ANY-LAYOUT {

SPECIFIC:

```

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REQ	Object-type	{'eomposite-page'},
REQ	Subordinates	{SUB_ID_OF(OriginalImage),
		[SUB_ID_OF(RevisionAnnotation) +]},
PERM	Dimensions	{REQ #horizontal-dimension-
		{REQ #fixed-dimension {\$BasicPageDimensions
		+ \$NonBasicPageDimensions}},
		REQ #vertical-dimension
		{REQ #fixed-dimension {\$BasicPageDimensions
		+ \$NonBasicPageDimensions}} \$PermissiblePage
		Dimensions},
PERM	Page-position	{ANY_VALUE},
PERM	Medium-type	{REQ #nominal-page-size {\$NominalPageSizes},
		REQ #side-of-sheet {ANY_VALUE}},
PERM	Imaging-order	{ANY_VALUE},
PERM	Application-comments	{ANY_VALUE}
		}

7.3.3.3 OriginalImage

OriginalImage:	ANY-LAYOUT	{
SPECIFIC:		
REQ	Object-type	{'frame'},
REQ	Subordinates	{SUB_ID_OF(SpecificBlock) + },
PERM	Position	{REQ #fixed-position
		{REQ #horizontal-position {ANY_INTEGERVALUE},
		REQ #vertical-position {ANY_INTEGERVALUE}}},
PERM	Dimensions	{REQ #horizontal-dimension
		{REQ #fixed-dimension {ANY_INTEGERVALUE}},
		REQ #vertical-dimension
		{REQ #fixed-dimension {ANY_INTEGERVALUE}}},
PERM	Application-comments	{ANY_VALUE}
		}

7.3.3.4 RevisionAnnotation

RevisionAnnotation:	ANY-LAYOUT	{
SPECIFIC:		
REQ	Object-type	{'frame'},
REQ	Subordinates	{SUB_ID_OF(SpecificBlock)},
PERM	Position	{REQ #fixed-position
		{REQ #horizontal-position {ANY_INTEGERVALUE},
		REQ #vertical-position {ANY_INTEGERVALUE}}},
PERM	Dimensions	{REQ #horizontal-dimension
		{REQ #fixed-dimension {ANY_INTEGERVALUE}},

REQ #vertical-dimension
 {REQ #fixed-dimension{ANY_INTEGERVALUE}}},
 PERM Application-comments {ANY_VALUE}}

7.3.3.5 SpecificBlock

SpecificBlock: {

SPECIFIC:

REQ Object-type {‘block’},
 REQ Object-identifier {ANY_VALUE},
 REQ Content-portions {\$CHAR | \$RAST | \$GEOM},
 PERM Position {REQ #fixed-position {
 REQ #horizontal-position {ANY_INTEGERVALUE},
 REQ #vertical-position {ANY_INTEGERVALUE}}},
 PERM Dimensions {REQ #horizontal-dimension
 {REQ #fixed-dimension{ANY_INTEGERVALUE}},
 REQ #vertical-dimension
 {REQ #fixed-dimension{ANY_INTEGERVALUE}}},
 PERM Object-class {ANY_VALUEOBJECT_CLASS_ID_OF(GenericBlock)},
 PERM Content-architecture-class {\$FC | \$FPR | \$FPG},
 PERM Transparency {‘transparent’ | ‘opaque’},
 PERM Colour {‘colourless’ | ‘white’},
 PERM User-readable-comments {ANY_STRING},
 PERM User-visible-name {ANY_STRING},
 PERM Application-comments {ANY_VALUE},
 -- See 8.1.3 and 8.2.3 --
 PERM Presentation-style {STYLE_ID_OF(PStyle1) | STYLE_ID_OF(PStyle2) |
 STYLE_ID_OF(PStyle3),
 -- PStyle1 for character content, PStyle2 for geometric, & PStyle3 for raster --
 PERM Presentation-attributes {

CASE SpecificBlock(Content-portions) OF {

[\$CHAR]:

{PERM #character-attributes {
 PERM #alignment {ANY_VALUE},
 PERM #character-spacing {ANY_VALUE},
 PERM #character-fonts {ANY_VALUE},
 PERM #character-orientation {‘0-degrees’ | ‘90-degrees’},
 PERM #character-path {‘0-degrees’ | ‘90-degrees’ | ‘180-degrees’ |
 ‘270-degrees’},
 PERM #code-extension-announcers {\$CDEXTANCDEXTEN},
 PERM #graphic-character-sets {\$PERMIT-GRCHAR},
 PERM #graphic-character-subrepertoire {ANY_VALUE},
 PERM #graphic-rendition {\$GRAPHICRENDITIONS},
 PERM #line-progression {‘90-degrees’ | ‘270-degrees’},
 PERM #line-spacing {ANY_VALUE},


```

    PERM #line-layout-table {ANY_VALUE},
  }},
  { $RAST }:
    { PERM #raster-graphics-attributes {
      PERM #Pel-path {ANY_VALUE},
      PERM #Line-progression {ANY_VALUE},
      PERM #Pel-spacing {ANY_VALUE},
      PERM #Spacing-ratio {REQ #line-spacing-value {ANY_VALUE},
        REQ #pel-spacing-value {ANY_VALUE}},
      PERM #Clipping {ANY_VALUE}}},
  { $GEOM }:
    { PERM #geometric-graphics-attributes {
      PERM #picture-dimensions {ANY_VALUE},
      PERM #picture-orientation {ANY_VALUE},
      PERM #text-rendition {PERM #fonts-list {ANY_VALUE},
        PERM #character-set-lists {ANY_VALUE}}}
  }}}

```

7.3.3.6 GenericBlock

```

GenericBlock: {
  GENERIC:
  REQ Object-type {'block'},
  REQ Content-portions {$CHAR | $RAST | $GEOM},
  PERM Position {REQ #fixed-position {
    REQ #horizontal-position {ANY_INTEGERVALUE},
    REQ #vertical-position {ANY_INTEGERVALUE}}},
  PERM Dimensions {REQ #horizontal-dimension {
    {REQ #fixed-dimension{ANY_INTEGERVALUE}},
    REQ #vertical-dimension {
      {REQ #fixed-dimension{ANY_INTEGERVALUE}},
      {ANY_VALUE},
    },
  },
  REQ Object-class-identifier {ANY_VALUE},
  PERM Resource {$FC | $FPR | $FPG},
  PERM Content-architecture-class {'transparent' | 'opaque'},
  PERM Transparency {'colourless' | 'white'},
  PERM Colour {ANY_STRING},
  PERM User-readable-comments {ANY_STRING},
  PERM User-visible-name {ANY_STRING},
  PERM Application-comments {ANY_VALUE},
  -- See 8.2 --
  PERM Presentation-style {STYLE_ID_OF(PStyle1) | STYLE_ID_OF(PStyle2) |
    STYLE_ID_OF(PStyle3),
    -- PStyle1 for character content, PStyle2 for geometric, & PStyle3 for raster
  PERM Presentation-attributes {

```

CASE ~~GenericBlock~~(Content-portions) OF {

[\$CHAR]:

```
{PERM #character-attributes {
  PERM #alignment {ANY_VALUE},
  PERM #character-spacing {ANY_VALUE},
  PERM #character-fonts {ANY_VALUE},
  PERM #character-orientation {'0-degrees' | '90-degrees'},
  PERM #character-path {'0-degrees' | '90-degrees' | '180-degrees' |
    '270-degrees'},
  PERM #code-extension-announcers {$CDEXTANCDEXTEN},
  PERM #graphic-character-sets {$PERMIT-GRCHAR},
  PERM #graphic-character-subrepertoire {$GRAPHICRENDITIONSANY_VALUE},
  PERM #graphic-rendition {$GRAPHICRENDITIONS},
  PERM #line-progression {'90-degrees' | '270-degrees'},
  PERM #line-spacing {ANY_VALUE},
  PERM #line-layout-table {ANY_VALUE},
}
```

}};

[\$RAST]:

```
{PERM #raster-graphics-attributes {
  PERM #Pel-path {ANY_VALUE},
  PERM #Line-progression {ANY_VALUE},
  PERM #Pel-spacing {ANY_VALUE},
  PERM #Spacing-ratio {REQ #line-spacing-value {ANY_VALUE},
    REQ #pel-spacing-value {ANY_VALUE}};
  PERM #Clipping {ANY_VALUE}};
```

[\$GEOM]:

```
{PERM #geometric-graphics-attributes {
  PERM #picture-dimensions {ANY_VALUE},
  PERM #picture-orientation {ANY_VALUE},
  PERM #text-rendition {PERM #fonts-list {ANY_VALUE},
    PERM #character-set-lists {ANY_VALUE}}}
```

}}}

7.4 Layout Style Constraints

No layout style constraints applicable in this clause.

7.5 Presentation Style Constraints

7.5.1 Macro Definitions

No macro definitions are applicable to this clause.

7.5.2 Factor Constraints

```

FACTOR:      ANY-PRESENTATION-STYLE  {

REQ  Presentation-style-identifier      {ANY_VALUE},
PERM User-readable-comments             {ANY_STRING},
PERM User-visible-name                  {ANY_STRING},
}
```

7.5.3 Presentation Style Constituent Constraint

7.5.3.1 PStyle1

```

PStyle1:      ANY-PRESENTATION-STYLE  {

-- This style is used for character content --

PERM Presentation-attributes           {
  PERM #character-attributes           {
    PERM #alignment                    {ANY_VALUE},
    PERM #character-spacing            {ANY_VALUE},
    PERM #character-fonts              {ANY_VALUE},
    PERM #character-orientation        {'0-degrees' | '90-degrees'},
    PERM #character-path               {'0-degrees' | '90-degrees' | '180-degrees' |
                                         '270-degrees'},
    PERM #code-extension-announcers    {$CDEXTANCDEXTEN},
    PERM #graphic-character-sets       {$PERMIT-GRCHAR},
    PERM #graphic-character-subrepertoire {$GRAPHICRENDITIONSANY_VALUE},
    PERM #graphic-rendition            {$GRAPHICRENDITIONS},
    PERM #line-progression              {'90-degrees' | '270-degrees'},
    PERM #line-spacing                 {ANY_VALUE},
    PERM #line-layout-table            {ANY_VALUE}}}
}
```

7.5.3.2 PStyle2

PStyle2: ANY-PRESENTATION-STYLE {

-- This style is used for geometric graphics content --

```

PERM Presentation-attributes {
  PERM #geometric-graphics-attributes {
    PERM #picture-dimensions {ANY_VALUE},
    PERM #picture-orientation {ANY_VALUE},
    PERM #text-rendition {PERM #fonts-list{ANY_VALUE},
                          PERM #character-set-list{ANY_VALUE}}}}
}

```

7.5.3.3 PStyle3

PStyle3: ANY-PRESENTATION-STYLE {

-- This style is used for raster graphics content --

```

PERM Presentation-attributes {
  PERM #raster-graphics-attributes {
    PERM #pel-path {ANY_VALUE},
    PERM #line-progression {ANY_VALUE},
    PERM #pel-spacing {REQ #length {ANY_VALUE},
                       REQ #pel-spaces {ANY_VALUE}},
    PERM #spacing-ratio {REQ #line-spacing-value {ANY_VALUE},
                        REQ #pel-spacing-value {ANY_VALUE}},
    PERM #clipping {ANY_VALUE}}
}

```

7.6 Content Portion Constraints**7.6.1 Macro Definitions**

DEFINE(TILED," ASN.1{2 8 3 7 5}") -- Tiled raster encoding --

7.6.2 Factor Constraints

No factor constraints are applicable to this clause.

7.6.3 Content Portion Constituent Constraints

7.6.3.1 Character Content Portion

```

Character-content-portion {
  REQ  Content-identifier-layout      {CONTENT_ID_OF(Character)ANY_VALUE},
  PERM  Type-of-coding                {ASN.1{2 8 3 6 0}},
  PERM  Alternative-representation    {ANY_STRING},
  PERM  Content-information
    {CHARACTER, {#STAB {ANY_VALUE}
      |#SHS {0-1,2,3,4ANY_VALUE}
      |#SGR {$GRAPHICRENDITIONS}
      |#SVS {0-1-2-4ANY_VALUE}
      |#SLS {ANY_VALUE}
      |#SCS {ANY_VALUE}
      |#SRS {ANY_VALUE}
      |#CR
      |#LF
      |#PLD
      |#PLU
      |#SP
      |#SUB
      |#$LS0
      |#$LS1R
      |#$LS2R
      |#$LS3R
      |#$SS2
      |#$SS3
      |#$DEG-CORE-G0
      |#$DEG-646-G0
      |#$DEG-ANY-G1
      |#$DEG-ANY-G2
      |#$DEG-ANY-G3
      |#$DEG-EMPTY-G1
      }...}
}

```

7.6.3.2 Raster Graphics Content Portion

```

Raster-graphics-content-portion {
  REQ  Content-identifier-layout      {CONTENT_ID_OF(RASTER)ANY_VALUE},
  PERM  Type-of-coding                { ASN.1{2 8 3 7 0} -- T.6 encoding --
      | ASN.1{2 8 3 7 1} -- T.4 one dimensional --
      | ASN.1{2 8 3 7 2} -- T.4 two dimensional --
      | ASN.1{2 8 3 7 3} -- bitmap encoding --
      | ASN.1{2 8 3 7 5} -- tiled encoding -- },
  PERM  Coding-attributes              {

```

```

REQ  #raster-graphics-coding-attributes {
  PERM G#compression {ANY_VALUE},
  REQPERM N#number-of-lines {>0},
  REQ N#number-of-pels-per-line {>0},
  PERM Type-of-coding {ASN.1{2 8 3 7 0} T.6 encoding
                      +ASN.1{2 8 3 7 3} bitmap encoding
                      +ASN.1{2 8 3 7 5} tiled encoding };
CASE Raster-graphics-content-portion (Type-of-coding) OF {
  {$TILED}: {PERM N#number-of-pels-per-tile-line {512},
             PERM N#number-of-lines-per-tile {512},
             PERM T#tiling-offset {ANY_VALUE},
             PERM T#tile-types {'null background' |
                                'null foreground' |
                                'T.6 encoded' |
                                'bitmap encoded'}}};
  PERM Alternative-representation {ANY_STRING},
  PERM Content-information {RASTER}
}

```

7.6.3.3 Geometric Graphics Content Portion

```

Geometric-graphics-content-portion {
  REQ Content-identifier-layout {CONTENT_ID_OF(GEOMETRIC)ANY_VALUE},
  PERM Type-of-coding {ASN.1{2 8 3 8 0}},
  PERM Alternative-representation {ANY_VALUE},
  PERM Content-information {GEOMETRIC}
}

```

7.7 Additional Usage Constraints

No other usage constraints are currently defined.

8 Interchange Format

Two interchange formats are supported by this profile. The Interchange Format Class A can be used by applications requiring a binary encoding based on ASN.1. The Interchange Format SDIF can be used by applications requiring a SGML based clear text encoding. This latter interchange format is an SGML application, called Office Document Language (ODL). For the purposes of interchange, the ODL ENTITIES are placed in an ASN.1 wrapper, as defined by SDIF. Each encoding form has inherent advantages. Conversion of document encoded in one interchange format into the other should not produce the loss of semantic document information.

8.1 Interchange Format Class A

8.1.1 Interchange Format

The value of the document profile attribute "interchange format" for this interchange format is 'if-a'. This form of ODIF is defined in ISO 8613-5.

The encoding is in accordance with the Basic Encoding Rules for Abstract Syntax Notation One (ASN.1), as defined in ISO 8825.

8.1.2 DAP Identifier

The value for the document profile attribute "Document application profile" for this interchange format is represented by the following object identifier.

Editor's Note - To be supplied.

8.1.3 Encoding of Application Comments

ISO 8613-5 define the encoding of the attribute Application Comments as an octet string. For SpecificBlock, this DAP requires that the encoding within that octet string be in accordance with the ASN.1 syntax specified in the following module definition.

```

NIST:DAPSpecification
DEFINITIONS ::= BEGIN
EXPORTS Object-Appl-Comm-Encoding;

Object-Appl-Comm-Encoding ::= SEQUENCE OF INTEGER
END

```

8.2 Interchange Format SDIF

8.2.1 Interchange Format

The document profile attribute "Interchange format" does not apply for this interchange format. The SDIF encoding of ODA is defined in Annex E of ISO 8613-5. In addition, ISO 8613-6, -7, and -8 contain additional specifications for this encoding of ODA.

8.2.2 DAP Identifier

The value for this attribute "Document application profile" for this interchange format is represented by the following object identifier.

Editor's Note - To be supplied.

8.2.3 Encoding of Application Comments

For SpecificBlock, the encoding of the attribute "Application comments" is defined in a data stream conforming to this profile with the following DTD definition:

```
<!DOCTYPE odaac [  
<!--  
<!DOCTYPE doc PUBLIC "-//USA-OIW//SGML ENCODED ODA APPLICATION  
COMMENTS//EN"> -->  
  
<!ELEMENT objappc - O (#PCDATA)>  
    <!-- Object application comment -->  

```

8.3 Encoding of Raster Content Information

The encoding of raster content information in the bitmap encoding scheme is that specified in 9.3 of the raster graphics content architecture part of ISO 8613-7, that is, the first pel in the order of bits is allocated to the most significant bit of an octet. The encoding of the code words in the Group 4 facsimile encoding scheme is such that the first or only bit of the first code word shall be placed in the least significant bit of the first octet. Subsequent bits of the first and following code words are placed in the direction of more significant bits in the first and following octets.

Annex A (normative)

Amendments and Corrigenda

A.1 Amendments

A.1.1 Amendments to the base standard

The amendments applicable to this DAP includes the ISO 8613 - Amendment 1: 1990. This amendment includes text to be included in ISO 8613-1 as the following annexes:

- a) Annex E: Use of ISO/IEC 10021 (MOTIS) to interchange documents conforming to ISO 8613;
- b) Annex F: Document application profile proforma and notation;
- c) Annex G: Conformance testing methodology;
- d) Annex H: Recording of documents conforming to ISO 8613 on flexible disk cartridges conforming to ISO 9293.

In addition, this amendment addresses the inclusion of the ISO 8613 Technical Corrigenda 1.

This DAP does not include the following features of the amendment:

- a) Addendum on security;
- b) Addendum on styles;
- c) Addendum on alternative representation.

Additionally, this DAP includes features from the Tiled Raster Graphics Addendum to ISO 8613-7, ISO/IEC JTC1/SC18/WG5 901, dated September 1990. A new version of ISO 8613-7 which also will incorporate the Colour Addendum is scheduled to be issued in 1992.

A.2 Corrigenda

A.2.1 Corrigenda to this DAP

~~There are no corrigenda to this DAP.~~ This version of the document (June 1992) incorporates editorial and technical changes approved at the March 1992 ODA SIG meeting. Technical changes include: addition of CCITT T.4 support, change basic value support for page sizes and pel spacing, and addition of position and dimension features. These changes were made to align more closely with FOD36 DAP, harmonize with PAGODA, and support Association for Information and Image Management (AIIM) requirements.

Annex B (informative)

Recommended Practices**B.1 Transfer methods for ODA****B.1.1 Conveyance of ODA over CCITT X.400-1984**

This recommendation describes how ODA body parts are to be encoded for transmission over a CCITT X.400-1984 service.

An ODA body part is encoded as OdaBodyPart in the definition given below:

```
OdaBodyPart ::= SEQUENCE { OdaBodyPartParameters, OdaData }
OdaBodyPartParameters ::= SET {
    document-application-profile
        [0] IMPLICIT OBJECT IDENTIFIER,
    document-architecture-class
        [1] IMPLICIT INTEGER {
            formatted (0),
            processable (1),
            formatted-processable (2) }
OdaData ::= SEQUENCE OF Interchange-Data-Element
```

NOTE - It is recommended to transfer an ODA document as a single body part with tag 12:

Oda [12] IMPLICIT OCTETSTRING

The content of the octet string is encoded as OdaBodyPart, defined above. However, this is out of the scope of this profile.

B.1.2 Conveyance of ODA over FTAM

This recommendation describes the FTAM Document Type to be used for minimal storage and transfer capabilities of ODA data streams. It is recognized that enhanced capabilities may at some point be added.

When using FTAM to transfer an ODA file, the FTAM-3, "ISO FTAM Unstructured Binary", document type should be specified. However, since files that do not contain ODA data streams can have the same document type, it is left up to the user of application programs that remotely access files using FTAM to know that a given file contains an ODA data stream.

B.1.3 Conveyance of ODA over DTAM

This recommendation provides for information concerning the interchange of ODA based documents with DTAM (Document Transfer and Manipulation) protocols.

DTAM is defined in the T.430-Series of recommendations and is, like ODA, an integral part of the T.400-Series of CCITT Recommendations named *Open Document Architecture, Transfer and Manipulation*.

The T.520-Series of recommendations contain *Communication Application Profiles (CAP)*. Recommendation T.522 describes the Communication Application Profile BT1 for document bulk transfer. Recommendation T.522 is applicable for the Office Document Format Profile (FOD) published in this ISP.

NOTE - The use of BT1 within the end-to-end oriented Telematic Services Telefax 4 and Teletex is described in 7.1 of Recommendation T.561 and 7.1 of Recommendation T.562.

B.1.4 Conveyance of ODA over flexible disks

The recommended method for interchanging ODA documents between systems by the exchange of magnetically recorded Flexible Disk Cartridges is by the use of an annex to ISO 8613-1 (to be published), *Recoding of Documents Conforming to ISO 8613 on Flexible Cartridges Conforming to ISO 9293*. This annex provides for recording each ODA document as a separate file as defined by ISO 9293, *Volume and File Structure of Flexible Disk Cartridges for Information Interchange*.

NOTE - Document encoded in ODL can be stored such that each SGML ENTITY is recorded in a separate file or in the case of an SDIF encoding, the file can be stored in a single file.

B.2 Font reference

The recommended method for specifying a font reference is to be based on ISO 9541. Such a reference is to be specified by the following ASN.1 encoding.

```

Fonts-Reference ::= SET {
    user-visible-name          (0) IMPLICIT Comment-String OPTIONAL,
    user-readable-comment      (1) IMPLICIT Comment-String OPTIONAL,
    reference-attributes       (2) IMPLICIT SET OF SET {
        precedence-number      (0) IMPLICIT INTEGER OPTIONAL,
        attributes              (1) IMPLICIT Font-Attribute-Set,
        user-readable-comment   (2) IMPLICIT Comment-String OPTIONAL }
    }

```

Font sizes from 6 to 72 points (100 to 1200 BMU) are intended to be supported by implementation conforming to this informative recommendation. All other values of font sizes may additionally be supported, but implementations may also support using some form of "fallback".

The minimum font properties and values from ISO 9541 that are to be specified in a Font-Attribute-Set be those specified by the following document application profile notation.

```

Font-Attribute-Set {
    PERM    Fontname          {ANY_VALUE},

```


PERM	Standardversion	{-- To be supplied --},
PERM	Dsnsource	{ANY_VALUE},
PERM	Fontfamily	{ANY_VALUE},
PERM	Posture	{'upright' 'italic-forward'},
PERM	Weight	{'light' 'medium' 'bold'},
PERM	Propwidth	{ANY_VALUE},
PERM	Glyphcomp	{
	PERM #inclglyphcols	{ANY_VALUE},
	PERM #exclglyphcols	{ANY_VALUE},
	PERM #inclglyphs	{ANY_VALUE},
	PERM #exclglyphs	{ANY_VALUE} },
PERM	Dsnsize	{ANY_VALUE},
PERM	Minsize	{
	PERM #numerator	{100 .. 1200},
	PERM #denominator	{1} },
PERM	Maxsize	{
	PERM #numerator	{100 .. 1200},
	PERM #denominator	{1} },
	-- BMU Units equivalent to range of 6..72 point sizes --	
PERM	Dsngroup	{
	PERM #group-code	{ANY_VALUE},
	PERM #subgroup-code	{ANY_VALUE},
	PERM #specific-group-code	{ANY_VALUE} },
PERM	Structure	{ANY_VALUE},
PERM	Wrmodes	{
	PERM #wrmodename	{ANY_VALUE},
	PERM #nomescdir	{'0-degrees' '90-degrees' '180-degrees' '270-degrees'},
	PERM #esclass	{ANY_VALUE},
	PERM #avgescx	{ANY_VALUE},
	PERM #avgescy	{ANY_VALUE} }
	}	

B.3 ISO 8632 (CGM) constraints for this DAP

It is recommended that geometric graphics content information contain only those elements listed in this portion of the document, in addition to the constraints imposed by ISO 8613-8. It is believed that this subset of the CGM is sufficiently implemented to enable interworking of geometric graphics for application conforming this document application profile.

Where an element has parameters, recommended constraints on the values are given. The "--" symbol indicates that there is no recommended constraint.

Requirements in ISO 8632 and ISO 8613-8 concerning mandatory elements, parameters must be fulfilled.

B.3.1 Delimiter elements

No-Op	See Note 1
Begin Metafile	See Note 2
End Metafile	
Begin Picture	See Note 2
Begin Picture Body	--
End Picture	

B.3.2 Metafile descriptor elements

Metafile Version	1
Metafile Description	See Notes 2, 3
VDC Type	--
Integer Precision	8, 16
Real Precision	(0,9,23), (1,16,16)
Index Precision	16
Colour Precision	8, 16
Colour Index Precision	8, 16
Maximum Colour Index	--
Colour Value Extent	--
Metafile Element List	--
Font List	--
Character Set List	See Note 5
Character Coding Announcer	0, (basic-7-bit), (basic-8-bit)

B.3.3 Picture descriptor elements

Scaling Mode	See Note 6
Colour Selection Mode	--
Line Width Specification Mode	--
Marker Size Specification Mode	--
Edge Width Specification Mode	--
VDC Extent	--
Background Colour	--

B.3.4 Control elements

VDC Integer Precision	16, 32
VDC Real Precision	(0,9,23), (1,16,16)
Auxiliary Colour	--
Transparency	--
Clip Rectangle	--
Clip Indicator	--

B.3.5 Graphical primitive elements

Polyline	See Note 7
Disjoint Polyline	See Note 7
Polymarker	See Note 7
Text	See Note 2

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Restricted Text	See Notes 2, 8
Append Text	See Notes 2, 8
Polygon	See Note 7
Polygon Set	See Note 7
Cell Array	See Note 9
Rectangle	--
Circle	--
Circular Arc 3 Point	--
Circular Arc 3 Point Close	--
Circular Arc Centre	--
1Circular Arc Centre Close	--
Ellipse	--
Elliptical Arc	--
Elliptical Arc Close	--

B.3.6 Attribute elements

Line Bundle Index	1-5
Line Type	1-5
Line Width	positive
Line Colour	--
Marker Bundle Index	1-5
Marker Type	1-5
Marker Size	--
Marker Colour	--
Text Bundle Index	1-5
Text Font Index	--
Text Precision	--
Character Expansion Factor	--
Character Spacing	--
Text Colour	--
Character Height	positive
Character Orientation	--
Text Path	--
Text Alignment	--
Character Set Index	--
Alternate Character Set Index	--
Fill Bundle Index	1-5
Interior Style	--
Fill Colour	--
Hatch Index	1-6
Pattern Index	1 .. 8, nx 1-16, ny 1-16
Edge Bundle Index	1-5
Edge Type	1-5
Edge Width	positive
Edge Colour	--
Edge Visibility	--

Fill Reference Point	--
Pattern Table	See Notes 10, 11
Pattern Size	--
Colour Table Specification	See Notes 12, 13
Aspect Source Flags	--

B.3.7 External elements

Message	No action
Application Data	See Note 2

NOTE -

1. An arbitrary sequence of n octets. Where $n=0, 1, \dots, 32767$. The sequence of zero or more octets is for padding purposes.
2. The string occurring in the parametric list of this element shall not contain more than 254 characters, except for data records where the string shall not contain more than 32767 characters.
3. There will be exactly one METAFILE DESCRIPTION element in the metafile. The METAFILE DESCRIPTION string parameter will be used to include the sub-string "ISO FCG13" to label the content information as conforming to this agreement. In addition, the METAFILE DESCRIPTION element should include a sub-string that identifies the generator of this metafile, including company, product, and product version.
4. The only character sets that may be specified are those specified for character content portions. Refer to 7.1, Document Profile Constraints, for further detail on which character sets are supported by this document application profile. The default character set for geometric graphics content is the same as the default character set for character content architecture.
5. The Scale Factor parameter of SCALING MODE element is always a 32-bit floating point value, even when the REAL PRECISION has selected fixed point for other real numbers. It is not apparent in ISO 8632 what the precision of this floating point value is when fixed point has been selected. Its precision shall be (0,9,23).
6. The maximum number of points of this element shall be 1024.
7. The complete restricted text string, including any appended text, shall be included in a metafile conforming to this agreement. The complete restricted text string shall be scaled isotropically such that the specified aspect ratio for the text is not distorted and the string fits into the text extent parallelogram. String of parameters shall not contain any control characters except as allowed by and necessary to implement the character set switching modes which can be selected by basic values of CHAR CODE ANNOUNCER.
8. The maximum number of colour values that can appear in the colour list parameter for the CELL ARRAY element shall be 1048576 (one 1024 x 1024 image).
9. The PATTERN TABLE element shall appear prior to any graphical primitive element to assure that interpreting systems without dynamic pattern update can render the intended effect. Once a given pattern representation is specified and used, it shall not be respecified.
10. Colour Array parameter for the PATTERN TABLE element is 2048. This will support 8 patterns of 16x16. The maximum number of colour values that can appear in a colour array parameter shall be 256 for each PATTERN TABLE element (one 16 x 16 pattern) and 2048 for the complete pattern table itself (eight 16 x 16 patterns).
11. The COLOUR TABLE element shall appear prior to any graphical primitive elements to assure that interpreting systems without dynamic colour update can render the intended effect. Once a given colour representation is

specified and used, it shall not be respecified. For indexed colour selection, either background colour or all colour indexes in the metafile shall have their representations specified or none shall. Colour indexes shall be specified by the COLOUR TABLE element. Background colour shall be specified either by the BACKGROUND COLOUR element or the the colour index 0. For direct colour selection, either the background colour or the colour of each displayed primitive shall be explicitly specified, or none shall be specified. In other words, either all colours shall be defaulted or none shall be defaulted.

12. The maximum number of colour values that can appear in the Colour List parameter for the COLOUR TABLE element is 64. This will support a 63 entry colour table.

B.4 Interoperability with SGML applications

The recommended method for the exchange of documents between Standard Generalized Markup Language (ISO 8879, SGML) based systems and systems based on this ODA document application profile is by means of exchanging a document representation conforming to these agreements in an encoded form of the SGML language known as the Office Document Language (ODL). ODL is a standardized SGML application for representing documents conforming to the ODA base standard. Such a representation can be converted into the Office Document Interchange Format (ODIF) supported by this document application profile.

Annex C (informative)

References to Other Standards and Registers

- [1] CCITT Recommendation T.400 : 1988, Introduction to Document Architecture, Transfer and Manipulation;
- [2] CCITT Recommendation T.411 : 1988, Open Document Architecture (ODA) and Interchange Format: Introduction and General Principles;
- [3] CCITT Recommendation T.412 : 1988, Open Document Architecture (ODA) and Interchange Format: Document Structures;
- [4] CCITT Recommendation T.414 : 1988, Open Document Architecture (ODA) and Interchange Format: Document Profile;
- [5] CCITT Recommendation T.415 : 1988, Open Document Architecture (ODA) and Interchange Format: Open Document Interchange Format;
- [6] CCITT Recommendation T.416 : 1988, Open Document Architecture (ODA) and Interchange Format: Character Content Architecture;
- [7] CCITT Recommendation T.417 : 1988, Open Document Architecture (ODA) and Interchange Format: Raster Graphics Content Architecture;
- [8] CCITT Recommendation T.418 : 1988, Open Document Architecture (ODA) and Interchange Format: Geometric Graphics Content Architecture;
- [9] CCITT Recommendation T.502 : 1990, Document Application Profile PM-11 for the Interchange of Character Content Documents in Processable and Formatted Forms;
- [10] CCITT Recommendation T.503 : 1984, Document Application Profile for the Interchange of Group 4 Facsimile Documents;
- [11] CCITT Recommendation T.505 : 1990, Document Application Profile PM-26 for the Interchange of Enhanced Mixed Content Documents in Processable and Formatted Forms;
- [12] ISO 8571 : 1988, Information processing systems - Open Systems Interconnection - File transfer, access and management;
- [13] ISO 9070 : 1990, Information processing - SGML support facilities - Registration procedures for public owner identifiers;
- [14] ISO/TR 9573 : 1988, Information processing - SGML technical report - Techniques for using SGML;
- [15] ISO 10021 : (to be published), Information processing systems - Text communication - Message Oriented Text Interchange System;

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- [16] ISP FOD11 : (to be published), Office document format profile for the interchange of basic function character content document in processable and formatted forms;**
- [17] ISP FOD26 : (to be published), Office document format profile for the interchange of enhanced function mixed content documents in processable and formatted forms;**
- [18] ISP FOD36 : (to be published), Office document format profile for the interchange of extended function mixed content documents in processable and formatted forms;**
- [19] MIL-R-28002A : 1990, MILITARY SPECIFICATION, RASTER GRAPHICS REPRESENTATION IN BINARY FORMAT, REQUIREMENTS FOR.**

Annex D (informative)**Supplementary Information on Attributes****Table D.1 Content coding attributes**

Attributes	Basic values	Default values	Non-basic values
Number-of-pels-per-line	any positive integer	None	None
Number-of-lines	any positive integer	None	None
Tiling-offset*	(any non-negative integer < 512, any non-negative integer < 512)	(0,0)	None
Tile-types*	T.6 encoded, bitmap encoded, null background, null foreground	T.6 encoded	None
Type-of-coding	T.6 encoding (untiled), bitmap (untiled), tiled, T.4 1D encoding, T.4 2D encoding	T.6 encoding	None

Tutorial Note - * Only used if Type-of-coding is "tiled"

Table D.2 Presentation attributes

Attributes	Basic values	Default values	Non-basic values
Pel-path	0, 90 deg	0 deg	180, 270 deg
Line-progression	270 deg	270 deg	90 deg
Pel-spacing	6 BMU (200) , 4 BMU (300) 16, 12, 8, 6, 5, 4, 3, 2, 1 BMU	4 BMU (300)	Any value except 'null'
Clipping	Two Coord. Pairs (any non-negative integer, any non-negative integer)	(0,0), (N-1, L-1)	None

Table D.3 Document profile attributes

Attribute	Class	Permissible values
Specific-layout-structure	m	present
Presentation-styles	nm	present
Document-characteristics	M	
Document-architecture-class	m	formatted
Document-application-profile	m	{– See clause 8 for a definition of the permitted values for this attribute. –}
Content-architecture-classes	m	{2 8 2 7 2}, {2 8 2 8 0}, {2 8 2 6 0}
Interchange-format-class	m	A
ODA-version	m	ISO 8613, 1989-07-04 1991-12-31
Document-architecture-defaults	M	
Content-architecture-class	m	formatted processable raster graphics
Type-of-coding	am	T.6 Encoding, (default) Tiled Encoding
Page-dimensions	nm	See list in table 1, (Default value is NA-A, 9240 x 13200 BMU)
Medium-types	nm	See list in table 1, (Default value is NA-A, 9240 x 13200 BMU)
Page-position	nm	any coordinate pair within page
Raster-gr-content-defaults	NM	
Pel-path	nm	0, 90, 180, 270 degrees (0 is normal default)
Line-progression	nm	90, 270 degrees (270 is normal default)
Clipping	nm	any coordinate pair within page
Pel-spacing	nm	6 BMU (200 pels/in.) or 4 BMU (300 pels/in.) , 16, 12, 8, 6, 5, 4, 3, 2, or 1 BMU (Normal default is 4 BMU)
Spacing Ratio	nm	Any value
Non-basic-doc-characteristics	NM	
Page-dimensions	nm	See table 1, NA F through NA K, roll paper
Medium-types	nm	See table 1, NA F through NA K, roll paper

Table D.3 Document profile attributes (concluded)

Attribute	Class	Permissible values
Raster-gr-presentation-features	NM	
Pel-path	nm	180, 270 degrees
Line-progression	nm	90 degrees
Pel-spacing	nm	Any value except 6 BMU (200 pels/in.) or 4 BMU (300 pels/in.) 16, 12, 8, 6, 5, 4, 3, 2, or 1 BMU
Document-management-attributes	M	
Document Reference	m	Any string of characters

The following notation is used in the class column of this table:

m mandatory attribute nm non-mandatory attribute d defaultable attribute

Capital letters (M, NM, and D) are used for groups of attributes.

Stable Implementation Agreements for Open Systems Interconnection Protocols: Part 23 - ODA Raster DAP

Output from the September 1992 Open Systems
Environment Implementors' Workshop (OIW)

SIG Chair: **James Wing, IBM**
SIG Editor: **Frank Spielman, NIST**

Foreword

This part of the Stable Implementation Agreements was prepared by the Office Document Architecture (ODA) Special Interest Group (SIG) of the Open Systems ~~Interconnection Environment~~ Implementors' Workshop (OIW). Development of this document application profile has been done in liaison with several organizations. These include the DoD Computer-aided Acquisition and Logistic Support (CALS) Office, Navy's David Taylor Research Center, and the ad-hoc Tiling Task Group.

This document application profile is intended to be suitable for the interchange of large format raster images.

This part contains four annexes:

- a) annex A (normative): ~~Addenda and errata~~ Amendments and corrigenda;
- b) annex B (informative): Recommended practices;
- c) annex C (informative): References to other standards and registers;
- d) annex D (informative): Supplementary information on attributes.

Future changes and additions to this version of these Implementor Agreements will be published as a new part. Deleted and replaced text will be shown as struckout. New and replacement text will be shown as shaded.

This part uses a convention of double and single quotes that has been established by ISO for use in the ODA base standard and related document application profiles. The convention is to use within the text double quotes to accentuate ODA attribute names and single quotes to accentuate values for those attributes.

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Part 23 - ODA Raster DAP

0 Introduction

This is the definition of a specification for an Open Document Architecture (ODA) Document Application Profile (DAP) named ODA Raster DAP. This DAP is suitable for interchanging documents in formatted form. The documents contain only raster graphics images.

There are two DAP object identifiers supporting this DAP with the only difference being in the encoding of the data stream. One uses the ASN.1 based ODIF encoding. The other uses the SGML/SDIF based ODL encoding. When this document refers to *this profile*, it is referring to this specification regardless of which DAP identifier may be selected to create the data stream.

This DAP has been prepared by the ODA Special Interest Group (SIG) of the ~~National Institute of Standards and Technology (NIST)~~ Open Systems ~~Interconnection (OSI)~~ Environment Implementors' Workshop (OIW). The DAP is defined in accordance with ISO 8613-1 and CCITT T.411 and follows the standardized proforma and notation defined in ISO 8613-1 Annex F. The DAP is based on ODA as defined in ISO 8613 and the Tiled Raster Graphics Addendum to ISO 8613, Part 7.

1 Scope and field of applications

This DAP specifies an interchange format suitable for transfer of structured documents between equipment designed for raster processing. The documents supported by this DAP are based on a paradigm of an electronic engineering drawing or illustration. Such documents contain one or more pages. Each page consists of an image in the form of a bi-tonal raster graphics content. There is no restriction on the minimum size of the image.

This document defines a DAP that allows large format raster documents to be interchanged in a formatted form in accordance with ISO 8613.

It is assumed that, when negotiation is performed by the service using this DAP, all non-basic ~~features-values~~ are subject to negotiation.

This DAP is independent of the processes carried out in an end system to create, edit, or reproduce raster documents. It is also independent of the means to transfer the document which, for example, may be by means of communication links or exchanged storage media.

The features of a document that can be interchanged using this DAP fall into the following categories:

- a) Page format features - these concern how the layout of each page of a document will appear when reproduced;
- b) Raster graphics layout and imaging features - these concern how the document content will appear within pages of the reproduced document; ~~and~~
- c) Raster graphics coding - these concern the raster graphics representations and control functions that make up the document raster graphics content.

2 Normative references

The following references are required in order to implement this DAP:

2.1 ISO

- [1] ISO 8613-1 : 1989, *Information processing - Text and Office Systems; Open Document Architecture (ODA) and Interchange Format - Part 1: Introduction and General Principles*;
- [2] ISO 8613-2 : 1989, *Information processing - Text and Office Systems; Open Document Architecture (ODA) and Interchange Format - Part 2: Document Structures*;
- [3] ISO 8613-4 : 1989, *Information processing - Text and Office Systems; Open Document Architecture (ODA) and Interchange Format - Part 4: Document Profile*;
- [4] ISO 8613-5 : 1989, *Information processing - Text and Office Systems; Open Document Architecture (ODA) and Interchange Format - Part 5: Open Document Interchange Format*;
- [5] ISO 8613-7 : 1989, *Information processing - Text and Office Systems; Open Document Architecture (ODA) and Interchange Format - Part 7: Raster Graphics Content Architectures*;
- [6] ISO 8613-1 : 1991, *Information processing - Text and Office Systems; Open Document Architecture (ODA) and Interchange Format - Part 1: Annex F - A Document Application Profile Proforma and Notation*;
- [7] ISO 8613-7 : (to be published), *Information processing - Text and Office Systems; Office Document Architecture (ODA) and Interchange Format - Part 7: Amendment - Tiled Raster Graphics Addendum to ISO 8613, Part 7*;
- [8] ISO 8613-7 : (to be published), *Information processing - Text and Office Systems; Office Document Architecture (ODA) and Interchange Format - Part 7: Amendment - Additional Bit Order Mapping Addendum*;
- [9] ISO 8824 : 1987, *Information Processing Systems - Open Systems Interconnection - Specification of Abstract Syntax Notation One (ASN.1)*;
- [10] ISO 8825 : 1987, *Information Processing Systems - Open Systems Interconnection - Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1)*;
- [11] ISO 8879 : 1986, *Information processing - Text and office systems - Standard Generalized Markup Language (SGML)*;
- [12] ISO 8879 : 1986, *Information processing - Text and office systems - Standard Generalized Markup Language (SGML), Amendment 1*;
- [13] ISO 9069 : 1988, *Information processing - SGML support facilities - SGML Document Interchange Format (SDIF)*.

2.2 CCITT

[14] Recommendation T.4 : 1988, *Standardization of Group 3 Facsimile Apparatus for Document Transmission*.

[125] Recommendation T.6 : 1988, *Facsimile Coding Schemes and Coding Control Functions for Group 4 Facsimile Apparatus*.

3 Definitions and terminology

3.1 Definitions

The definitions given in ISO 8613-1 are applicable to this document.

3.2 Constituent names

Each constituent that may be included in a document that conforms to this profile has been given a unique name which serves to identify that constituent throughout this profile.

The convention is that full names are used (i.e., no abbreviations are used), two or more words in a name are concatenated and each word begins with a capital. Examples of constituent names used in this profile are CompositePage, DocumentLayoutRoot, and SpecificBlock.

In clause 6 of this profile, each constituent provided by this profile is underlined once at the point in the text at which the purpose of that constituent is defined. This also serves to identify all the constituents provided by this profile.

The same constituent names are also used in the technical specification in clause 7 of this profile so that there is a one-to-one correspondence between the use of these names in clauses 6 and 7.

Although the constituent names relate to the purpose of the constituents, the semantics of constituents must not be implied from the actual names that are used. Also, these names do not appear in an interchanged document but a mechanism for identifying constituents in an interchange document is provided. Thus in an application using this profile, the constituents may be known to the user by different names.

4 Relationship to other DAPs

Functionally, this DAP is a functional superset of the CCITT Recommendation T.503, A Document Application Profile for the Interchange of Group 4 Facsimile Documents. This DAP is a functional subset of Part 22 - ODA Image DAP.

5 Conformance

In order to conform to this DAP, a data stream representing a document must meet the requirements specified in 5.1.

The requirements for implementations that originate and/or receive data streams conforming to this DAP are specified in 5.2.

5.1 Data stream conformance

The following requirements apply to the encoding of data streams that conform to these agreements:

- a) The data stream shall be encoded in accordance with the ASN.1 encoding rules defined in ISO 8825 or the SGML ~~encoding rules defined in grammar and syntax of~~ ISO 8879;
- b) The data stream shall be structured in accordance with the interchange format defined in ~~clause 8 of this DAP~~;
- c) The document shall be structured in accordance with only the formatted document architecture class specified in ~~clause 7 of this DAP~~. In addition, the document shall contain all mandatory constituents specified for that class and may optionally contain constituents permitted for that class as specified in clause 7;
- d) Each constituent shall contain all those attributes specified as required for that constituent in this profile. Other attributes may be specified provided they are permitted for that constituent;
- e) The attributes shall have values within the range of permissible values specified in this profile;
- f) The encoded document shall be structured in accordance with the abstract document architecture defined in ISO 8613-2;
- g) The encoded document shall be structured in accordance with the characteristics defined in ~~clause 6 of this DAP~~ and shall contain only those features defined in clause 6.

5.2 Implementation conformance

This clause states the requirements for implementations claiming conformance to this DAP.

A conforming receiving implementation must be capable of receiving *either* any data streams conforming to this profile structured in accordance with ODIF *or* any data streams conforming to this profile structured in accordance with ODL *or* both of these. Receiving usually, but not always, involves recognizing and further processing the data stream elements.

6 Characteristics supported by this DAP

This clause describes the characteristics of documents that can be represented by data streams conforming to this profile. This clause also describes how these characteristics are represented in terms of divisional components of the data streams.

6.1 Overview

This DAP describes the features of ISO 8613 that are needed to support the interchange of documents containing only raster graphics content. It specifies interchange formats for the transfer of structured documents with simple layout structures.

This DAP describes documents that can be interchanged in the formatted form, which facilitates the reproduction of a document as intended by the originator.

Only one category of content is allowed within the document, that is, a raster graphics content in the formatted processable form. This is intended to facilitate the reproduction of the document content as intended by the originator.

This clause describes the layout features that can be represented in documents conforming to this DAP. The features are described in terms that are typical of the user-perceived capabilities and semantics found in a raster document interchange environment.

For the purpose of interchange, a document is represented as a collection of **constituents**, each of which is represented by a set of attributes. The constituents that make up a formatted document are defined below in this clause and are illustrated in figure 1.

Constituents defined as **required** must occur in any document that conforms to this profile. Constituents listed as **optional** may or may not be present in the document, depending on the requirements of the particular document.

The required constituents include:

- a) a document profile;
- b) layout object descriptions representing a specific layout structure;

c) content portion description.

The only optional constituent is the presentation style.

Document Profile
Presentation Style (Optional)
Specific Layout Structure
Content Portion Description

Figure 1 - Constituents

6.2 Logical constituents

Not applicable.

6.3 Layout constituents

This clause describes the features of the layout objects that can be represented in documents conforming to this DAP.

6.3.1 Overview of the layout characteristics

The document structure allows the document content to be laid out and presented in one or more pages. Each page in a document consists of only a single raster graphics content representing an engineering drawing, illustration, or other raster scanned image.

A specific layout structure of the document conforming to this application profile consists of a four-level hierarchy consisting of a document layout root, composite pages, frames, and blocks. The document can consist of multiple composite pages where each page represents a single image. Each composite page consists of a frame which in turn contains a block containing the content associated with the image.

Figure 2 is an illustration of the features of the document layout structure supported by this DAP.

6.3.2 DocumentLayoutRoot

A DocumentLayoutRoot is the top level in a document layout structure. A DocumentLayoutRoot consists of a sequence of one or more CompositePage constituent constraints.

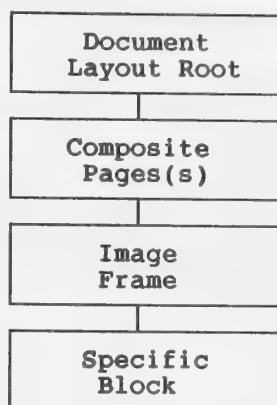


Figure 2 - Document layout structure

6.3.3 Page characteristics

Only one constituent constraint is provided to present pages within a document.

A document consists of a sequence of one or more composite pages. In a document's composite page, a frame is used to position a single raster graphics content representing the image on the page.

A document may consist of multiple pages of different sizes. Each page may be either landscape or portrait orientation. Both orientations are permitted in the document.

6.3.3.1 CompositePage

A CompositePage is a constituent constraint which defines a composite page that corresponds to the page area used for presenting the sequence of an ImageFrame frame.

6.3.3.2 Page dimensions

A wide variety of page dimensions are supported including large format raster documents. The dimensions of the pages may be specified as any value, in BMU measurement units, including the larger sizes produced from foldout-size images and roll paper. These sizes apply to both portrait and landscape orientations. The page sizes include: ISO A0-A5, ANSI A-K, Japanese legal and letter, foldouts 27.94 cm (11 in.) X 35.56 cm (14 in.) and 27.94 cm (11 in.) X 43.18 cm (17 in.), and 27.94 cm (11 in.) roll paper. See table 1.

~~Dimensions equivalent to or less than the actual (nominal) page sizes of ANSI E in both portrait and landscape orientations are basic values. Larger dimensions (F-K) including those produced from roll paper are non-basic and their use must be indicated in the document profile. Although ISO A0-A4 sizes are not generally used, the A1-A4 sizes do fall within the range of the ANSI E sizes and therefore could be considered basic values (See table 2). A0 size is a non-basic value.~~

~~Dimensions equivalent to or less than the common assured reproduction area (CARA) of ISO A4 and North American Letter (NAL) in portrait or landscape orientation are basic values. Larger page sizes including~~

those produced from roll paper are non-basic and their use must be indicated in the document profile (See table 2).

The default dimensions are the ~~Common Assured Reproduction Area (CARA)~~ of North American Letter (A). Any default page dimensions may be specified in the document profile subject to the maximum dimensions defined above by using the "Ppage dimensions" attribute. The "Ppage position" attribute may be used to specify the position of the pel array image on the page. Although actual page dimensions may be used allowing for the raster content to completely fill a page leaving no borders, it is advised that the assured reproduction area (ARA) listed in table 1 be used wherever feasible. See 7.3 of ISO 8613-2 for general rules for positioning pages on presentation surfaces.

6.3.3.3 Nominal page sizes

The nominal page sizes that may be specified are listed in table 1. ~~In addition, 11 inch roll paper of any length is supported. These may be specified in portrait or landscape orientations. All values of nominal page size up to ANSI E size are basic. All sizes larger than ANSI E size and roll paper are non-basic and their use in a document must be indicated in the document profile using the Medium type attribute (See table 2).~~ All values of nominal page size are non-basic and hence all values used in a document must be indicated in the document profile using the "medium type" attribute (See table 2).

Any of the nominal page sizes defined in table 1, subject to the restriction specified above, may be specified as the default value in the document profile.

Table 1 also includes the recommended ~~assured reproduction area (ARA)~~. Information loss may occur when a document is reproduced if the dimensions of the CompositePage exceed the ARA for the specified nominal page size.

6.3.4 ImageFrame

An ImageFrame is a constituent constraint which defines a lowest level frame used for laying out the image of an engineering drawing, illustration, or other raster scanned image. This frame contains a single SpecificBlock containing a raster graphics content portion. Note that there must be exactly one ImageFrame on each page and one block in the frame.

The frame has a fixed position that is equal to the origin of the page. The vertical and horizontal dimensions of this frame are fixed and equal to the maximum size that can be achieved for the position within the area of the page.

6.3.5 SpecificBlock

A SpecificBlock is a constituent constraint which defines a basic layout object used to position and image the content portions associated with an ImageFrame.

The position of the block is fixed and defaults to the origin of the superior frame. The dimensions default to the maximum size that can be achieved for the position within the area of the superior frame.

Table 1 - Dimensions for various page sizes

Page type	Size	Size (BMU)	ARA (BMU)
- Metric			
ISO-A5	148mm x 210mm	7015 x 9920	not defined
ISO-A4	210mm x 297mm	9920 x 14030	9240 x 13200
ISO-A3	297mm x 420mm	14030 x 19840	13200 x 18480
ISO-A2	420mm x 594mm	19840 x 28060	18898 x 27118
ISO-A1	594mm x 841mm	28060 x 39680	26173 x 37843
ISO-A0	841mm x 1189mm	39680 x 56120	37843 x 54283
- ANSI, North American (NA)			
NA-A	8.5in x 11in	10200 x 13200	9240 x 12400
NA-B	11in x 17in	13200 x 20400	12744 x 19656
NA-C	17in x 22in	20400 x 26400	19500 x 25800
NA-D	22in x 34in	26400 x 40800	25800 x 39600
NA-E	34in x 44in	40800 x 52800	39600 x 52200
NA-F	28in x 40in	33600 x 48000	32400 x 47400
NA-G	11in x 90in	13200 x 108000	12400 x 106800
NA-H	28in x 143in	33600 x 171600	31400 x 170400
NA-J	34in x 176in	40800 x 211200	39600 x 210000
NA-K	40in x 143in	48000 x 171600	47400 x 170400
NA-Legal	8.5in x 14in	10200 x 16800	9240 x 15480
- Foldouts			
Small	11in x 14in	13200 x 16800	12744 x 15480
NA-B	11in x 17in	13200 x 20400	12744 x 19656
- Japan			
Legal	257mm x 364mm	12141 x 17196	11200 x 15300
Letter	182mm x 257mm	8598 x 12141	7600 x 10200

Tutorial Note - These page sizes are for the portrait orientation.

Table 2 - Layout attributes

Attributes	Basic values	Default values	Non-basic values
Page dimensions **	CARA NA-A-F, CARA NA-Legal, ISO-A4-A1, Small-Foldout CARA NA-A, ISO-A4	CARA NA-A	ARA NA-GB-K, ISO A0-A3, Japan legal, 11" Roll Paper
Medium-type ** (Nominal page size)	NA-A-F, NA-Legal, ISO-A4-A1, Small-Foldout None	NA-A None	NA-GB-K, ISO A0-A5, Japan letter & legal, 11" Roll Paper

Tutorial Note - See table 1 **

6.4 Document layout characteristics

This DAP provides ~~for only~~ formatted documents. Hence, no provision is made for constraining the document layout process other than as implied in the formatted documents supported by this DAP. In particular, these formatted documents are characterized by the following:

- Documents containing only composite pages;
- Documents may contain one or more pages;
- Pages may vary by orientation within a document;
- Each page contains a single raster graphics content portion representing the image;
- Content is positioned within fixed position and dimension frames.

6.5 Content layout and imaging control

A document is modelled as an image represented by a raster graphics content portion, as specified in ISO 8613-7.

The only content architecture that may be specified using the attribute "Content architecture class" is formatted processable raster graphics. The formatted processable raster graphics content must be specified as the default in the document profile.

6.5.1 Raster graphics content

6.5.1.1 Introduction

This clause defines the features that are applicable to the raster graphics content.

The default values for the following features may be specified in the document profile:

- a) type of coding (required);
- b) compression;
- c) pel path;
- d) line progression;
- e) pel spacing;
- f) spacing ratio;
- g) clipping.

The specification in a document of a non-basic feature value by a presentation or coding attribute must be indicated in the document profile.

6.5.1.2 Raster graphics content architecture

The formatted processable raster graphics content is the only content architecture class supported by this DAP and is the only default content architecture class that can be specified in the document profile.

In a composite page, only one content portion can be associated with the image.

6.5.1.3 Raster graphics encoding methods

~~Three encoding methods, CCITT T.6 (untiled), Tiled, and Bitmap are supported by this profile as basic values. Neither the CCITT T.4 one-dimensional method nor the CCITT T.4 two-dimensional method is supported.~~

~~The CCITT Recommendation T.6 Group 4 compression algorithm shall be used in all cases, tiled and untiled, except where it is more efficient to retain an image or tile image in bitmap format or to specify a tile as being either all background or all foreground.~~

~~The content may be encoded in accordance with the encoding schemes defined in CCITT Recommendations T.4 and T.6. In the case of T.4, either the one-dimensional or two-dimensional encoding scheme may be used. Also the bitmap encoding scheme defined in ISO 8613-7 may be used. All these forms of encoding may be used in a single document and all are basic values. 'Uncompressed' mode of~~

encoding may also be used but only as a non-basic feature value.

In a content portion, it is required that the Number of pels per line and Number of lines parameters of the Coding attributes be specified. The value of these parameters shall be a positive number. Otherwise, no constraints are placed on these parameters by this profile. In a content portion, it is required that the coding attribute "number of pels per line" be specified. The coding attribute "number of lines" may also be specified. No restriction is placed on the values that may be specified for these coding attributes. This profile places no constraints on the size of the pel arrays that may be used as long as the size does not exceed the page dimension size.

The type of coding method used is specified by the attribute "Type of coding". The use of this attribute is mandatory in the "Document architecture defaults" of the document profile to define the default value of either "T.6 encoding" (untiled), "T.6 encoding - MSB" (untiled), or "Tiled encoding". The use of this attribute in the description of the content portions is non-mandatory. If this attribute is not specified for a particular content portion, then the default value specified in the "Document architecture defaults" of the document profile is used.

If the Tiled encoding method is used, the default value of 512 for the "Number of pels per tile line" and "Number of lines per tile" must be used. No other values are supported, therefore these two attributes do not need to be specified. If the "Tile types" attribute is not present, then all tiles will be T.6 encoded. If it is present, then there must be a value specified for each tile in which case only 'null background', 'null foreground', 'T.6 encoded', 'T.6 encoded - MSB', or 'bitmap encoded' values are supported. The T.4 one dimensional and T.4 two dimensional encodings are not supported. There are no restrictions on the use of the "Tiling offset" attribute other than that specified in ISO 8613-7 Addendum.

See table D.1, Annex D, for a tabulated list of the attributes and their basic, default, and non-basic values.

6.5.1.4 Raster presentation

Raster presentation is controlled by the presentation attributes specified in ISO 8613-7. This DAP provides for additional constraints on these presentation attributes as specified below.

The basic values for the attribute "Pel path" values supported by this profile are 0 and 90 degrees. The "Pel path" values of 180 and 270 degrees are non-basic.

The basic values for the attribute "Line progression" value supported by this profile is 270 degrees. The "Line progression" value of 90 degrees is non-basic.

The basic Pel spacing values supported by this profile are the ratios equal to 6 and 4 BMUs between adjacent pels. This corresponds to equivalent resolutions of 200 and 300 pels per 25.4 mm (1 in.), respectively when the BMU is interpreted as 1/1200 inch. Values for Pel spacing other than these ratios are non-basic, i.e., 5, 3, 2, and 1 BMU. These correspond to equivalent resolutions of 240, 400, 600, and 1200 pels per 25.4 mm (1 in.).

Any value may be explicitly specified for pel spacing provided that the spacing between pels is not less than 1 BMU. The pel spacing need not be an integer value. The value of 'null' may not be specified because the scalable layout process is not supported. The specification of the spacings of 16, 12, 8, 6, 5, 4, 3, 2, and 1 BMU between adjacent pels are basic. The specification of any other spacing is non-basic and must

be specified in the document profile.

NOTES

1 The basic pel spacing values listed above are equivalent to resolutions of 75, 100, 150, 200, 240, 300, 400, 600, and 1200 pels per 25.4mm respectively when the BMU is interpreted as 1/1200 inch.

2 The attribute "pel spacing" specifies two integers, the ratio of which determines the pel spacing. No restriction is placed on the values of these integers.

There are no restrictions on the use of the "Clipping" attribute. The "Image dimensions" attribute is not supported.

There are no restrictions placed on the value of the "Spacing ratio" attribute providing that the resultant line spacing is not less than 1 BMU. Also, the line spacing need not be an integral number of BMUs. All values are basic.

See table D.2, Annex D, for a tabulated list of the attributes and their basic, default, and non-basic values.

6.6 Miscellaneous features

Specification of the attribute "application comments" is optional. When used in conjunction with the "Type of coding" of "Tiled encoding", it contains a sequence of positive integers, one for each tile in the content portion. The sequence of integers is a set of indices representing the octet offsets to the beginning of the respective tiles, starting from the beginning of the "content information". A tile index of zero(0) indicates that the respective tile is null. The integers will be sequenced in the same order as the tiles. The tiles will be sequenced primarily in the Ppel path and secondarily in the Lline progression direction as defined by the presentation attributes.

6.7 Document management features

Every document interchanged in accordance with this DAP must include a document profile containing information which relates to the document as a whole.

The features specified by the document profile are listed below. A definition of the information contained in these features is given in the corresponding attribute definitions in ISO 8613-4.

Document constituent information:

- a) specific layout structure;
- b) presentation styles (optional).

Document characteristics:

- a) document application profile;

- b) document application profile defaults;
- c) document architecture class;
- d) content architecture class;
- e) interchange format class;
- f) ODA version date;
- g) raster graphics content defaults.

Non-basic document characteristics:

- a) page dimensions;
- b) medium type;
- c) raster graphics presentation features.

Document management attributes:

- a) document description (only document reference supported).

The attributes applicable to the document profile are defined in table D.3, Annex D.

7 Specification of constituent constraints

7.1 Document profile constraints

7.1.1 Macro definitions

-- General macros --

DEFINE(FDA, "{ 'formatted' }")

DEFINE(DAC, "DocumentProfile (Document-architecture-class)")

DEFINE(FPR, "ASN.1 { 2 8 2 7 2 }") -- Raster formatted processable --

-- Basic page dimensions. --

DEFINE(BasicPageDimension, "

{REQ #horizontal-dimension {REQ #fixed-dimension { <= 40960 1..9240 }},

REQ #vertical-dimension {REQ #fixed-dimension { <= 52800 1..12400 }}}

~~Any size equal to or smaller than the actual page size of ISO A1 and ANSI E portrait.~~

| {REQ #horizontal-dimension {REQ #fixed-dimension { <= 52800 1..12400 }},

REQ #vertical-dimension {REQ #fixed-dimension { <= 40800 1 9240 }}}

— Any size equal to or smaller than the actual page size of ISO A1 and ANSI E landscape. —

"

— Any size equal to or smaller than CARA (Common Assured Reproduction Area) of ISO A4 and NA A. Both Portrait and Landscape may be specified. —

-- Non-basic page dimensions. --

DEFINE(NonBasicPageDimensions,"

{REQ #horizontal-dimension {REQ #fixed-dimension {40801..48000}};

REQ #vertical-dimension {REQ #fixed-dimension {52801..211200}}}

— Any size larger than the range of basic values in ANSI E portrait and equal to or smaller than the full size of ANSI K portrait. —

+ {REQ #horizontal-dimension {REQ #fixed-dimension {52801..211200}};

REQ #vertical-dimension {REQ #fixed-dimension {40801..48000}}}

— Any size larger than the range of basic values in ANSI E landscape and equal to or smaller than the full size of ANSI K landscape. —

+ {REQ #horizontal-dimension {REQ #fixed-dimension {13200}};

REQ #vertical-dimension {REQ #fixed-dimension {>= 16801}}}

— Any portrait size larger than the typical foldout size (11 in x 14 in) including 11 inch roll paper. —

+ {REQ #horizontal-dimension {REQ #fixed-dimension {>= 16801}};

REQ #vertical-dimension {REQ #fixed-dimension {13200}}}

— Any landscape size larger than the typical foldout size (14 in x 11 in) including 11 inch roll paper. —

"

DEFINE(NonBasicPageDimensions,"

{REQ #horizontal-dimension {REQ #fixed-dimension {1..39680}};

REQ #vertical-dimension {REQ #fixed-dimension {12401..56120}}}

+ {REQ #horizontal-dimension {REQ #fixed-dimension {9241..39680}};

REQ #vertical-dimension {REQ #fixed-dimension {1..56120}}}

— up to ISO A0 portrait —

+ {REQ #horizontal-dimension {REQ #fixed-dimension {1..56120}};

REQ #vertical-dimension {REQ #fixed-dimension {9241..39680}}}

+ {REQ #horizontal-dimension {REQ #fixed-dimension {12401..56120}};

REQ #vertical-dimension {REQ #fixed-dimension {1..39680}}}

— up to ISO A0 landscape —

+ {REQ #horizontal-dimension {REQ #fixed-dimension {1..48000}};

REQ #vertical-dimension {REQ #fixed-dimension {12401..211200}}}

+ {REQ #horizontal-dimension {REQ #fixed-dimension {9241..48000}};

REQ #vertical-dimension {REQ #fixed-dimension {1..211200}}}

— up to ANSI J/K portrait —

+ {REQ #horizontal-dimension {REQ #fixed-dimension {1..211200}};

REQ #vertical-dimension {REQ #fixed-dimension {9241..48000}}}

+ {REQ #horizontal-dimension {REQ #fixed-dimension {12401..211200}};

REQ #vertical-dimension {REQ #fixed-dimension {1..48000}}}

— up to ANSI J/K landscape —

+ {REQ #horizontal-dimension {REQ #fixed-dimension {1..12141}};

REQ #vertical-dimension {REQ #fixed-dimension {12401..17196}}}

+ {REQ #horizontal-dimension {REQ #fixed-dimension {9241..12141}};

REQ #vertical-dimension {REQ #fixed-dimension {1..17196}}}

— up to Japanese legal portrait —


```

| {REQ #horizontal-dimension {REQ #fixed-dimension {1..17196}}},
REQ #vertical-dimension {REQ #fixed-dimension {9241..12141}}}
| {REQ #horizontal-dimension {REQ #fixed-dimension {12401..17196}}},
REQ #vertical-dimension {REQ #fixed-dimension {1..12141}}}
    -- up to Japanese legal landscape --
| {REQ #horizontal-dimension {REQ #fixed-dimension {13200}}},
REQ #vertical-dimension {REQ #fixed-dimension {>= 16801}}}
    -- Any portrait size larger than the typical foldout size (11 in x 14 in) including 11 inch roll paper. --
| {REQ #horizontal-dimension {REQ #fixed-dimension {>= 16801}}},
REQ #vertical-dimension {REQ #fixed-dimension {13200}}}
    -- Any landscape size larger than the typical foldout size (14 in x 11 in) including 11 inch roll paper --
)

```

DEFINE(PermissiblePageDimensions,"

```

{REQ #horizontal-dimension {REQ #fixed-dimension {1..39680}}},
REQ #vertical-dimension {REQ #fixed-dimension {1..56120}}}
    -- up to ISO A0 portrait --
| {REQ #horizontal-dimension {REQ #fixed-dimension {1..56120}}},
REQ #vertical-dimension {REQ #fixed-dimension {1..39680}}}
    -- up to ISO A0 landscape --
| {REQ #horizontal-dimension {REQ #fixed-dimension {1..48000}}},
REQ #vertical-dimension {REQ #fixed-dimension {1..211200}}}
    -- up to ANSI J/K portrait --
| {REQ #horizontal-dimension {REQ #fixed-dimension {1..211200}}},
REQ #vertical-dimension {REQ #fixed-dimension {1..48000}}}
    -- up to ANSI J/K landscape --
| {REQ #horizontal-dimension {REQ #fixed-dimension {1..12141}}},
REQ #vertical-dimension {REQ #fixed-dimension {1..17196}}}
    -- up to Japanese legal portrait --
| {REQ #horizontal-dimension {REQ #fixed-dimension {1..17196}}},
REQ #vertical-dimension {REQ #fixed-dimension {1..12141}}}
    -- up to Japanese legal landscape --
)

```

DEFINE(NominalPageSizes,"

-- ISO Page Sizes --

```

{REQ #horizontal-dimension {7015}, REQ #vertical-dimension {9920}
    -- ISO A5 Portrait -- }
| {REQ #horizontal-dimension {9920}, REQ #vertical-dimension {7015}
    -- ISO A5 Landscape -- }
| {REQ #horizontal-dimension {9920}, REQ #vertical-dimension {14030}
    -- ISO A4 Portrait -- }
| {REQ #horizontal-dimension {14030}, REQ #vertical-dimension {9920}
    -- ISO A4 Landscape -- }
| {REQ #horizontal-dimension {14030}, REQ #vertical-dimension {198430}
    -- ISO A3 Portrait -- }
| {REQ #horizontal-dimension {198430}, REQ #vertical-dimension {14030}
    -- ISO A3 Landscape -- }

```

```

| {REQ #horizontal-dimension {198430}, REQ #vertical-dimension {280630}
  -- ISO A2 Portrait -- }
| {REQ #horizontal-dimension {280630}, REQ #vertical-dimension {198430}
  -- ISO A2 Landscape -- }
| {REQ #horizontal-dimension {280630}, REQ #vertical-dimension {39732680}
  -- ISO A1 Portrait -- }
| {REQ #horizontal-dimension {39732680}, REQ #vertical-dimension {280630}
  -- ISO A1 Landscape -- }
| {REQ #horizontal-dimension {39732680}, REQ #vertical-dimension {56173120}
  -- ISO A0 Portrait -- }
| {REQ #horizontal-dimension {56173120}, REQ #vertical-dimension {39732680}
  -- ISO A0 Landscape -- }

```

-- ANSI Page Sizes --

```

| {REQ #horizontal-dimension {10200}, REQ #vertical-dimension {13200}
  -- ANSI A Portrait -- }
| {REQ #horizontal-dimension {13200}, REQ #vertical-dimension {10200}
  -- ANSI A Landscape -- }
| {REQ #horizontal-dimension {10200}, REQ #vertical-dimension {16800}
  -- ANSI Legal Portrait -- }
| {REQ #horizontal-dimension {16800}, REQ #vertical-dimension {10200}
  -- ANSI Legal Landscape -- }
| {REQ #horizontal-dimension {13200}, REQ #vertical-dimension {20400}
  -- ANSI B Portrait -- }
| {REQ #horizontal-dimension {20400}, REQ #vertical-dimension {13200}
  -- ANSI B Landscape -- }
| {REQ #horizontal-dimension {20400}, REQ #vertical-dimension {26400}
  -- ANSI C Portrait -- }
| {REQ #horizontal-dimension {26400}, REQ #vertical-dimension {20400}
  -- ANSI C Landscape -- }
| {REQ #horizontal-dimension {26400}, REQ #vertical-dimension {40800}
  -- ANSI D Portrait -- }
| {REQ #horizontal-dimension {40800}, REQ #vertical-dimension {26400}
  -- ANSI D Landscape -- }
| {REQ #horizontal-dimension {40800}, REQ #vertical-dimension {52800}
  -- ANSI E Portrait -- }
| {REQ #horizontal-dimension {52800}, REQ #vertical-dimension {40800}
  -- ANSI E Landscape -- }
| {REQ #horizontal-dimension {33600}, REQ #vertical-dimension {48000}
  -- ANSI F Portrait -- }
| {REQ #horizontal-dimension {48000}, REQ #vertical-dimension {33600}
  -- ANSI F Landscape -- }
| {REQ #horizontal-dimension {13200}, REQ #vertical-dimension {108000}
  -- ANSI G Portrait -- }
| {REQ #horizontal-dimension {108000}, REQ #vertical-dimension {13200}
  -- ANSI G Landscape -- }
| {REQ #horizontal-dimension {33600}, REQ #vertical-dimension {171600}
  -- ANSI H Portrait -- }

```



```

| {REQ #horizontal-dimension {171600}, REQ #vertical-dimension {33600}
    -- ANSI H Landscape -- }
| {REQ #horizontal-dimension {40800}, REQ #vertical-dimension {211200}
    -- ANSI J Portrait -- }
| {REQ #horizontal-dimension {211200}, REQ #vertical-dimension {40800}
    -- ANSI J Landscape -- }
| {REQ #horizontal-dimension {48000}, REQ #vertical-dimension {171600}
    -- ANSI K Portrait -- }
| {REQ #horizontal-dimension {171600}, REQ #vertical-dimension {48000}
    -- ANSI K Landscape -- }

```

-- Foldouts --

```

| {REQ #horizontal-dimension {13200}, REQ #vertical-dimension {16800}
    -- Foldout Portrait -- }
| {REQ #horizontal-dimension {16800}, REQ #vertical-dimension {13200}
    -- Foldout Landscape -- }
| {REQ #horizontal-dimension {13200}, REQ #vertical-dimension {>= 16801}
-- Any portrait size larger than the typical foldout size (11 in x 14 in) including 11 inch roll paper --
| {REQ #horizontal-dimension {>= 16801}, REQ #vertical-dimension {13200}
-- Any landscape size larger than the typical foldout size (14 in x 11 in) including 11 inch roll paper --

```

")

7.1.2 Constituent constraints

7.1.2.1 DocumentProfile

{

-- Presence of document constituents --

```

REQ    Specific-layout-structure    {'present'},
PERM   Presentation-styles          {'present'},

```

-- Document characteristics --

```

REQ    Document-application-profile  {-- See clause 8 for a definition of the permitted values for
                                         this attribute. --},

```

```

REQ    Document-application-profile-defaults {

```

-- Document architecture defaults --

```

REQ    #content-architecture-class    {$FPR},
PERM   #dimensions                    {BasicPageDimensions
                                         NonBasicPageDimensions $PermissiblePageDimensions},
PERM   #medium-type                   {

```

PERM #nominal-page-size {\$NominalPageSizes},
 PERM #side-of-sheet {ANY_VALUE}},

-- Any permitted medium type. Both landscape and portrait may be specified. --

REQ #type-of-coding {ASN.1 {2 8 3 7 0} -- T6 encoding --
 | ASN.1 {2 8 3 7 5} -- tiled encoding --
 | ASN.1 {2 8 3 7 6} -- T6 encoding - MSB -- },

PERM #page-position {ANY_VALUE},

PERM raster-graphics-contents-defaults {

PERM #pel-path {ANY_VALUE},

PERM #line-progression {ANY_VALUE},

PERM #pel-spacing {REQ #length {6+4ANY_VALUE},
 REQ #pel-spaces {1ANY_VALUE}},

PERM #spacing-ratio

{REQ #line-spacing-value {ANY_VALUE},

REQ #pel-spacing-value {ANY_VALUE}},

PERM #compression {'compressed' | 'uncompressed' ANY_VALUE},

PERM #clipping {ANY_VALUE}},

REQ Document-architecture-class {\$FDA},

REQ Content-architecture-classes {\$FPR},

REQ Interchange-format-class {-- This attribute required only for ODIF
 interchange. See clause 8 for a definition of the
 permitted values for this attribute. --},

REQ ODA-version

{REQ #standard-or-recommendation {'ISO 8613'},

REQ #publication-date {'1989-07-04' | '1991-12-31'}},

-- This date represents the date that this DAP was approved. This is the only
 -- approved value, however, the date will be changed if the DAP is significantly
 -- revised. If the date is revised, use of the new date is required only when the
 -- additional functionality is being used. That is, legacy products may continue to
 -- support the earlier DAP.

-- Non-basic document characteristics --

PERM Page-dimensions {PMUL {\$NonBasicPageDimensions}},

PERM Medium-types {PMUL{

PERM #nominal-page-size {\$NominalPageSizes},

PERM #side-of-sheet {ANY_VALUE}}},

-- All values of "medium type" are non-basic --

PERM Coding-attributes {

REQ #raster-graphics-coding-attributes {

REQ #compression {'uncompressed'}}},

PERM Presentation-features {

PERM #Raster-graphics-presentation-features {MUL {
 PMUL PERM #pel-path {'180-degrees' |
 '270-degrees'}},

```

[ PERM #line-progression {'90-degrees'},
PMUL PERM #pel-spacing {REQ #length {ANY_VALUE}
EXCEPT 6,4 {16,12,8,6,5,4,3,2,1},
REQ #pel-spaces {ANY_VALUE}
EXCEPT
{1}};

PMUL PERM #spacing-ratio
{REQ #line-spacing-value {ANY_VALUE} EXCEPT
{1},
REQ #pel-spacing-value {ANY_VALUE} EXCEPT
{1}}}};

```

-- Document management attributes --

```

-- Document description --
REQ Document-reference {ANY_VALUE}

```

}

7.2 Logical constituent constraints

No logical constituents applicable in this clause.

7.3 Layout constituent constraints

7.3.1 Macro definitions

```

DEFINE(RAST," CONTENT_ID_OF(RASTERRaster-graphics-content-portion)")

```

7.3.2 Factor constraints

```

FACTOR: ANY-LAYOUT {
SPECIFIC:
PERM Object-type {VIRTUAL},
REQ Object-identifier {ANY_VALUE},
PERM Subordinates {VIRTUAL},
PERM User-visible-name {ANY_VALUE},
PERM User-readable-comments {ANY_VALUE};
}

```

7.3.3 Constituent constraints**7.3.3.1 DocumentLayoutRoot**

DocumentLayoutRoot: ANY-LAYOUT {

SPECIFIC:

REQ Object-type { 'document-layout-root'},
 REQ Subordinates {SUB_ID_OF(CompositePage) + }
 }

7.3.3.2 CompositePage

CompositePage: ANY-LAYOUT {

SPECIFIC:

REQ Object-type {'ecomposite-page'},
 REQ Subordinates {SUB_ID_OF(ImageFrame)},
 PERM Dimensions {REQ #horizontal dimension-
 {REQ #fixed dimension {\$BasicPageDimensions
 + \$NonBasicPageDimensions}}},
 REQ #vertical dimension
 {REQ #fixed dimension {\$BasicPageDimensions
 + \$NonBasicPageDimensions}} \$PermissiblePageDimensions},
 PERM Page-position {ANY_VALUE},
 PERM Medium-type {PERM #nominal-page-size {\$NominalPageSizes},
 PERM #side-of-sheet {ANY_VALUE}},
 PERM Application-comments {ANY_VALUE}
 }

7.3.3.3 ImageFrame

ImageFrame: ANY-LAYOUT {

SPECIFIC:

REQ Object-type {'frame'},
 REQ Subordinates {SUB_ID_OF(SpecificBlock)},
 PERM Application-comments {ANY_VALUE}
 }

7.3.3.4 SpecificBlock

SpecificBlock: {

SPECIFIC:

REQ Object-type {'block'},

REQ	Object-identifier	{ANY_VALUE},
REQ	Content-portions	{\$RAST},
PERM	Position	{REQ #fixed-position { REQ #horizontal-position {ANY_VALUE}, REQ #vertical-position {ANY_VALUE}}},
PERM	Dimensions	{REQ #horizontal-dimension REQ #fixed-dimension{ANY_VALUE}}, REQ #vertical-dimension REQ #fixed-dimension{ANY_VALUE}}},
PERM	Content-architecture-class	{\$FPR},
PERM	User-readable-comments	{ANY_STRING},
PERM	User-visible-name	{ANY_STRING},
PERM	Application-comments	{ANY_VALUE},
		-- See 8.1.3 and 8.2.3 --
PERM	Presentation-style	{STYLE_ID_OF(PStyle)},
	-- PStyle for raster content --	
PERM	Presentation-attributes	{
PERM	#raster-graphics-attributes	{
PERM	#pel-path	{ANY_VALUE},
PERM	#line-progression	{ANY_VALUE},
PERM	#pel-spacing	{ANY_VALUE},
PERM	#pel-spacing	{REQ #length {ANY_VALUE}, REQ #pel-spaces {ANY_VALUE}}},
PERM	#spacing-ratio	{REQ #line-spacing-value {ANY_VALUE}, REQ #pel-spacing-value {ANY_VALUE}}},
PERM	#clipping	{ANY_VALUE}}}
		}

7.4 Layout style constraints

No layout style constraints applicable in this clause.

7.5 Presentation style constraints

7.5.1 Macro definitions

No macro definitions are applicable to this clause.

7.5.2 Factor constraints

FACTOR:	ANY-PRESENTATION-STYLE	{
REQ	Presentation-style-identifier	{ANY_VALUE},
PERM	User-readable-comments	{ANY_STRING},
PERM	User-visible-name	{ANY_STRING}

}

7.5.3 Presentation style constituent constraint

7.5.3.1 PStyle

PStyle: ANY-PRESENTATION-STYLE {

-- This style is used for raster graphics content --

```

PERM Presentation-attributes {
  PERM #raster-graphics-attributes {
    PERM #pel-path {ANY_VALUE},
    PERM #line-progression {ANY_VALUE},
    PERM #pel-spacing {REQ #length {ANY_VALUE},
      REQ #pel-spaces {ANY_VALUE}},
    PERM #spacing-ratio {REQ #line-spacing-value {ANY_VALUE},
      REQ #pel-spacing-value {ANY_VALUE}},
    PERM #clipping {ANY_VALUE}}
}
```

7.6 Content portion constraints

7.6.1 Macro definitions

DEFINE(TILED," ASN.1{2 8 3 7 5}") -- Tiled raster encoding --

7.6.2 Factor constraints

No factor constraints are applicable to this clause.

7.6.3 Content portion Constituent constraints

7.6.3.1 Raster graphics content portion

```

Raster-graphics-content-portion: {
  REQ Content-identifier-layout {CONTENT_ID_OF(RASTER)ANY_VALUE},
  PERM Type-of-coding {
    ASN.1{2 8 3 7 0} -- T.6 encoding --
    ASN.1{2 8 3 7 1} -- T.4 one dimensional --
    ASN.1{2 8 3 7 2} -- T.4 two dimensional --
    ASN.1{2 8 3 7 3} -- bitmap encoding --
    ASN.1{2 8 3 7 5} -- tiled encoding --
  }
```

```

ASN.1{2 8 3 7 6} -- T.6 encoding - MSB --
ASN.1{2 8 3 7 7} -- T.4 one dimensional - MSB --
ASN.1{2 8 3 7 8} -- T.4 two dimensional - MSB --

```

```

PERM Coding-attributes {
  REQ #raster-graphics-coding-attributes {
    PERM C#compression {ANY_VALUE},
    REQPERM N#number-of-lines {>0},
    REQ N#number-of-pels-per-line {>0},
    PERM Type-of-coding {
      ASN.1{2 8 3 7 0} T.6 encoding
      ASN.1{2 8 3 7 3} bitmap encoding
      ASN.1{2 8 3 7 5} tiled encoding
    },
    CASE Raster-graphics-content-portion (Type-of-coding) OF {
      ($TILED): {
        PERM N#number-of-pels-per-tile-line {512},
        PERM N#number-of-lines-per-tile {512},
        PERM T#tiling-offset {ANY_VALUE},
        PERM T#tile-types {
          'null background' |
          'null foreground' |
          'T.6 encoded' |
          'bitmap encoded' |
          'T.6 encoded - MSB'
        }
      }
    }
  }
}

PERM Alternative-representation {ANY_STRING},
PERM Content-information {RASTER}
}

```

7.7 Additional usage constraints

No other usage constraints are currently defined.

8 Interchange format

Two interchange formats are supported by this profile. The Interchange Format ODIF (Class A) can be used by applications requiring a binary encoding based on ASN.1. The Interchange Format SDIF can be used by applications requiring a SGML based clear text encoding. This latter interchange format is an SGML application, called Office Document Language (ODL). For the purposes of interchange, the ODL ENTITIES are placed in an ASN.1 wrapper, as defined by SDIF. Each encoding form has inherent advantages. Conversion of document encoded in one interchange format into the other should not produce the loss of semantic document information.

8.1 Interchange format ODIF (class A)

8.1.1 Interchange format

The value of the document profile attribute "interchange format" for this interchange format is 'if-a'. This form of ODIF is defined in ISO 8613-5.

The encoding is in accordance with the Basic Encoding Rules for Abstract Syntax Notation One (ASN.1), as defined in ISO 8825.

8.1.2 DAP identifier

The value for the document profile attribute "document application profile" for this interchange format is represented by the following object identifier.

Editor's Note — To be supplied.

iso (1) identified-organization (3) oiw (14) odasig (11) image-appl (1) raster-dap-odif (1)

8.1.3 Encoding of application comments

ISO 8613-5 define the encoding of the attribute "Application Comments" as an octet string. For SpecificBlock, this DAP requires that the encoding within that octet string be in accordance with the ASN.1 syntax specified in the following module definition.

```

NISTDAPSpecification
DEFINITIONS ::= BEGIN
EXPORTS Object-Appl-Comm-Encoding;

Object-Appl-Comm-Encoding ::= SEQUENCE OF INTEGER
END

```

8.2 Interchange format SDIF

8.2.1 Interchange format

The document profile attribute "interchange format" does not apply for this interchange format. The SDIF encoding of ODA is defined in Annex E of ISO 8613-5. In addition, ISO 8613-6, -7, and -8 contains additional specifications for this encoding of ODA.

8.2.2 DAP Identifier

The value for this attribute "Document application profile" for this interchange format is represented by the following object identifier.

Editor's Note — To be supplied.

iso (1) identified-organization (3) oiw (14) odasig (11) image-appl (1) raster-dap-sdlf (2)

8.2.3 Encoding of application comments

For SpecificBlock, the encoding of the attribute "Application comments" is defined in a data stream conforming to this profile with the following DTD definition:

```
<!DOCTYPE odaac {
<!--
<!DOCTYPE doc PUBLIC "-//USA-OIW//SGML ENCODED ODA APPLICATION
COMMENTS//EN"-->

<ELEMENT objappe O (#PCDATA)>
  <!-- Object application comment -->
-->
```

<!-- The following set of declarations may be invoked by using a public entity as follows.

```
<!DOCTYPE odaac Public "-//USA-OIW//DTD SGML ENCODING ODA APPLICATION COMMENTS//EN">
-->
```

<!-- NOTE: To parse the following Document Type Declaration Subset, place the Document Type declaration " <!DOCTYPE odaac [" at the beginning of the file and "]">" at the end of the file. -->

```
<ELEMENT odaac - - (objappe)+ >
```

```
<!-- Object application comment -->
```

```
<ELEMENT objappe - O (#PCDATA)>
```

8.3 Encoding of raster content information

The encoding of raster content information in the bitmap encoding scheme is that specified in 9.3 of the raster graphics content architecture part of ISO 8613-7, that is, the first pel in the order of bits is allocated to the most significant bit of an octet. The encoding of the code words in the Group 4 facsimile encoding scheme is such that the first or only bit of the first code word shall be placed in the least significant bit of the first octet. Subsequent bits of the first and following code words are placed in the direction of more significant bits in the first and following octets. The encoding of the code words in the CCITT Recommendation T.4 and T.6 encoding schemes may be done in either the up or down bit order. The bit order is specified by the attributes "type of coding" or "tile types". The attribute "tile types" is used only when the value for "type of coding" is 'tiled encoded'. For the up order, it is such that the first or only bit of the first code word shall be placed in the least significant bit of the first octet. Subsequent bits of the first and following code words are placed in the direction of more significant bits in the first and following octets.

For the down order, it is such that the first or only bit of the first code word shall be placed in the most significant bit (MSB) of the first octet. Subsequent bits of the first and following code words are placed in the direction of least significant bits in the first and following octets.

Annex A (normative)

Amendments and corrigenda**A.1 Amendments****A.1.1 Amendments to the base standard**

The amendments applicable to this DAP includes the ISO 8613 - Amendment 1: 1990. This amendment includes text to be included in ISO 8613-1 as the following annexes:

- a) Annex E: Use of ISO/IEC 10021 (MOTIS) to interchange documents conforming to ISO 8613;
- b) Annex F: Document application profile proforma and notation;
- c) Annex G: Conformance testing methodology;
- d) Annex H: Recording of documents conforming to ISO 8613 on flexible disk cartridges conforming to ISO 9293.

In addition, this amendment addresses the inclusion of the ISO 8613 Technical Corrigenda 1.

This DAP does not include the following features of the amendment:

- a) Addendum on security;
- b) Addendum on styles;
- c) Addendum on alternative representation.

Additionally, this DAP includes features from the Tiled Raster Graphics Addendum to ISO 8613-7, ISO/IEC JTC1/SC18/WG5 901, dated September 1990, and the Additional Bit Order Mapping Addendum to CCITT Rec. T.417/ISO 8613-7, ISO/IEC JTC 1/WG 3, dated July 1991. A new version of ISO 8613-7 which also will incorporate the Colour Addendum is scheduled to be issued in 1992.

A.2 Corrigenda**A.2.1 Corrigenda to this DAP**

There are no corrigenda to this DAP. The previous version of the document (June 1992) incorporated editorial and technical changes approved at the March 1992 ODA SIG meeting as well as minor editorial changes approved at the June 1992 ODA SIG meeting. Technical changes included: addition of CCITT T.4 support, change basic value support for page sizes and pel spacing, addition of position and dimension features, and

addition of object identifiers. These changes were made to align more closely with FOD36 DAP, harmonize with PAGODA, and support Association for Information and Image Management (AIIM) requirements.

This version of the document (September 1992) incorporates one technical and other editorial changes approved at the September 1992 ODA SIG meeting. The technical change was to add object identifiers to the "type of coding" attribute to support both up and down bit order sequences.

Annex B (informative)

Recommended practices**B.1 Transfer methods for ODA****B.1.1 Conveyance of ODA over CCITT X.400-1984**

This recommendation describes how ODA body parts are to be encoded for transmission over a CCITT X.400-1984 service.

An ODA body part is encoded as OdaBodyPart in the definition given below:

```
OdaBodyPart ::= SEQUENCE { OdaBodyPartParameters, OdaData }
OdaBodyPartParameters ::= SET {
    document-application-profile
        [0] IMPLICIT OBJECT IDENTIFIER,
    document-architecture-class
        [1] IMPLICIT INTEGER {
            formatted (0),
            processable (1),
            formatted-processable (2) }
OdaData ::= SEQUENCE OF Interchange-Data-Element
```

NOTE - It is recommended to transfer an ODA document as a single body part with tag 12:

Oda [12] IMPLICIT OCTETSTRING

The content of the octet string is encoded as OdaBodyPart, defined above. However, this is out of the scope of this profile.

B.1.2 Conveyance of ODA over FTAM

This recommendation describes the **File Transfer, Access, and Management (FTAM)** Document Type to be used for minimal storage and transfer capabilities of ODA data streams. It is recognized that enhanced capabilities may at some point be added.

When using FTAM to transfer an ODA file, the FTAM-3, "ISO FTAM Unstructured Binary", document type should be specified. However, since files that do not contain ODA data streams can have the same document type, it is left up to the user of application programs that remotely access files using FTAM to know that a given file contains an ODA data stream.

B.1.3 Conveyance of ODA over DTAM

This recommendation provides for information concerning the interchange of ODA based documents with Document Transfer and Manipulation (DTAM) ~~(Document Transfer and Manipulation)~~ protocols.

DTAM is defined in the T.430-Series of recommendations and is, like ODA, an integral part of the T.400-Series of CCITT Recommendations named *Open Document Architecture, Transfer and Manipulation*.

The T.520-Series of recommendations contain *Communication Application Profiles (CAP)*. Recommendation T.522 describes the Communication Application Profile BT1 for document bulk transfer. Recommendation T.522 is applicable for the Office Document Format Profile (FOD) published in this ISP.

NOTE - The use of BT1 within the end-to-end oriented Telematic Services Telefax 4 and Teletex is described in 7.1 of Recommendation T.561 and 7.1 of Recommendation T.562.

B.1.4 Conveyance of ODA over flexible disks

The recommended method for interchanging ODA documents between systems by the exchange of magnetically recorded Flexible Disk Cartridges is by the use of an annex to ISO 8613-1 (to be published), *Recoding of Documents Conforming to ISO 8613 on Flexible Cartridges Conforming to ISO 9293*. This annex provides for recording each ODA document as a separate file as defined by ISO 9293, *Volume and File Structure of Flexible Disk Cartridges for Information Interchange*.

NOTE - Document encoded in ODL can be stored such that each SGML ENTITY is recorded in a separate file or in the case of an SDIF encoding, the file can be stored in a single file.

B.2 Interoperability with SGML applications

The recommended method for the exchange of documents between Standard Generalized Markup Language (ISO 8879, SGML) based systems and systems based on this ODA document application profile is by means of exchanging a document representation conforming to these agreements in an encoded form of the SGML language known as the Office Document Language (ODL). ODL is a standardized SGML application for representing documents conforming to the ODA base standard. Such a representation can be converted into the Office Document Interchange Format (ODIF) supported by this document application profile.

Annex C (informative)

References to other standards and registers

CCITT Recommendation T.400 : 1988, Introduction to Document Architecture, Transfer and Manipulation;

CCITT Recommendation T.411 : 1988, Open Document Architecture (ODA) and Interchange Format: Introduction and General Principles;

CCITT Recommendation T.412 : 1988, Open Document Architecture (ODA) and Interchange Format: Document Structures;

CCITT Recommendation T.414 : 1988, Open Document Architecture (ODA) and Interchange Format: Document Profile;

CCITT Recommendation T.415 : 1988, Open Document Architecture (ODA) and Interchange Format: Open Document Interchange Format;

CCITT Recommendation T.417 : 1988, Open Document Architecture (ODA) and Interchange Format: Raster Graphics Content Architecture;

CCITT Recommendation T.503 : 1984, Document Application Profile for the Interchange of Group 4 Facsimile Documents;

ISO 8571 : 1988, Information processing systems - Open Systems Interconnection - File transfer, access and management;

ISO 9070 : 1990, Information processing - SGML support facilities - Registration procedures for public owner identifiers;

ISO/TR 9573 : 1988, Information processing - SGML technical report - Techniques for using SGML;

ISO 10021 : (to be published), Information processing systems - Text communication - Message Oriented Text Interchange System;

ISP FOD26 : (to be published), Office document format profile for the interchange of enhanced function mixed content documents in processable and formatted forms;

ISP FOD36 : (to be published), Office document format profile for the interchange of extended function mixed content documents in processable and formatted forms;

MIL-R-28002A : 1990, MILITARY SPECIFICATION, RASTER GRAPHICS REPRESENTATION IN BINARY FORMAT, REQUIREMENTS FOR.

Annex D (informative)**Supplementary information on attributes****Table D.1 - Content coding attributes**

| Attributes | Basic values | Default values | Non-basic values |
|-------------------------|---|---|------------------|
| Number-of-pels-per-line | any positive integer | None | None |
| Number-of-lines | any positive integer | None | None |
| Tiling-offset* | (any non-negative integer < 512, any non-negative integer < 512) | (0,0) | None |
| Tile-types* | T.6 encoded, bitmap encoded, null background, null foreground, T.6 encoded - MSB | T.6 encoded | None |
| Type-of-coding | T.6 encoding (untiled), bitmap (untiled), tiled encoded, T.4 1D encoding, T.4 2D encoding, T.6 encoding - MSB (untiled), T.4 1D encoding - MSB, T.4 2D encoding - MSB | T.6 encoding, T.6 encoding - MSB, tiled encoding ** | None |

Tutorial Note - * Only used if "type of coding" is 'tiled encoded'

Tutorial Note - ** As specified in the document profile

Table D.2 - Presentation attributes

| Attributes | Basic values | Default values | Non-basic values |
|------------------|---|-------------------|-------------------------|
| Pel-path | 0, 90 deg | 0 deg | 180, 270 deg |
| Line-progression | 270 deg | 270 deg | 90 deg |
| Pel-spacing | 6 BMU (200) , 4 BMU (300) 16, 12, 8, 6, 5, 4, 3, 2, 1 BMU | 4 BMU (300) | Any value except 'null' |
| Clipping | Two Coordinate Pairs (any non-negative integer, any non-negative integer) | (0,0), (N-1, L-1) | None |

Table D.3 - Document profile attributes

| Attribute | Class | Permissible values |
|--------------------------------|-------|--|
| Specific-layout-structure | m | present |
| Presentation-styles | nm | present |
| Document-characteristics | M | |
| Document-architecture-class | m | formatted |
| Document-application-profile | m | {- See clause 8 for a definition of the permitted values for this attribute. -} |
| Content-architecture-classes | m | {2 8 2 7 2} |
| Interchange-format-class | m | A |
| ODA-version | m | ISO 8613, 1989-07-04 1991-12-31 |
| Document-architecture-defaults | M | |
| Content-architecture-class | m | formatted processable raster graphics |
| Type-of-coding | am | T.6 Encoding, (default) Tiled Encoding, T.6 encoding - MSB |
| Page-dimensions | nm | See list in table 1, (Default value is NA-A, 9240 x 13200 BMU) |
| Medium-types | nm | See list in table 1, (Default value is NA-A, 9240 x 13200 BMU) |
| Page-position | nm | any coordinate pair within page |
| Raster-gr-content-defaults | NM | |
| Pel-path | nm | 0, 90, 180, 270 degrees (0 is normal default) |
| Line-progression | nm | 90, 270 degrees (270 is normal default) |
| Clipping | nm | any coordinate pair within page |
| Pel-spacing | nm | 6 BMU (200 pels/in.) or 4 BMU (300 pels/in.), 16, 12, 8, 6, 5, 4, 3, 2, 1 BMU, (Normal default is 4 BMU) |
| Spacing Ratio | nm | Any value |
| Non-basic-doc-characteristics | NM | |
| Page-dimensions | nm | See table 1, NA-F through NA-K, roll paper |
| Medium-types | nm | See table 1, NA-F through NA-K, roll paper |

Table D.3 - Document profile attributes (concluded)

| Attribute | Class | Permissible values |
|---------------------------------|-------|--|
| Raster-gr-presentation-features | NM | |
| Pel-path | nm | 180, 270 degrees |
| Line-progression | nm | 90 degrees |
| Pel-spacing | nm | Any value except 6 BMU (200 pels/in.)
or 4 BMU (300 pels/in.) 16, 12, 8, 6, 5,
4, 3, 2, or 1 BMU |
| Document-management-attributes | M | |
| Document Reference | m | Any string of characters |

The following notation is used in the class column of this table:

m mandatory attribute nm non-mandatory attribute d defaultable attribute

Capital letters (M, NM, and D) are used for groups of attributes.

Annex E (informative)

Register Index**Table E.1 - Object Identifiers**

| Object Identifier | Reference |
|--|------------------|
| iso (1) identified-organization (3) oiw (14) odasig (11)
image-appl (1) raster-dap-odif (1) | 8.1.2 |
| iso (1) identified-organization (3) oiw (14) odasig (11)
image-appl (1) raster-dap-sdif (2) | 8.2.2 |

Stable Implementation Agreements for Open Systems Interconnection Protocols: Part 24 - Conformance Testing

Output from the September 1992 Open Systems
Environment Implementors' Workshop (OIW)

SIG Chair: **Eva Kuiper, Hewlett Packard**
Workshop Editor: **Brenda Gray, NIST**

Foreword

This part of the Stable Implementation Agreements was prepared by the Conformance Testing Special Interest Group (CTSIG) of the Open Systems Environment Implementors' Workshop (OIW).

Text in this part has been approved by the Plenary of the above-mentioned Workshop.

Future changes and additions to this version of these Implementor Agreements will be published as a new part. Deleted and replaced text will be shown as struck. New and replacement text will be shown as shaded.

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Part 24 - Conformance Testing 1

Part 24 - Conformance Testing

Editor's Note - This part is reserved for future stable Conformance Testing Agreements. These agreements may be found in the aligned part of the Working Implementation Agreements document. When these agreements become stable, they will be moved into Part 24.



Stable Implementation Agreements for Open Systems Interconnection Protocols: Part 25 - Health Care

Output from the September 1992 Open Systems
Environment Implementors' Workshop (OIW)

SIG Chair:
Workshop Editor:

John J. Harrington, Hewlett Packard
Brenda Gray, NIST

Foreword

This part of the Stable Implementation Agreements was prepared by the Health Care Special Interest Group (HCSIG) of the Open Systems Environment Implementors' Workshop (OIW).

Text in this part has been approved by the Plenary of the above-mentioned Workshop.

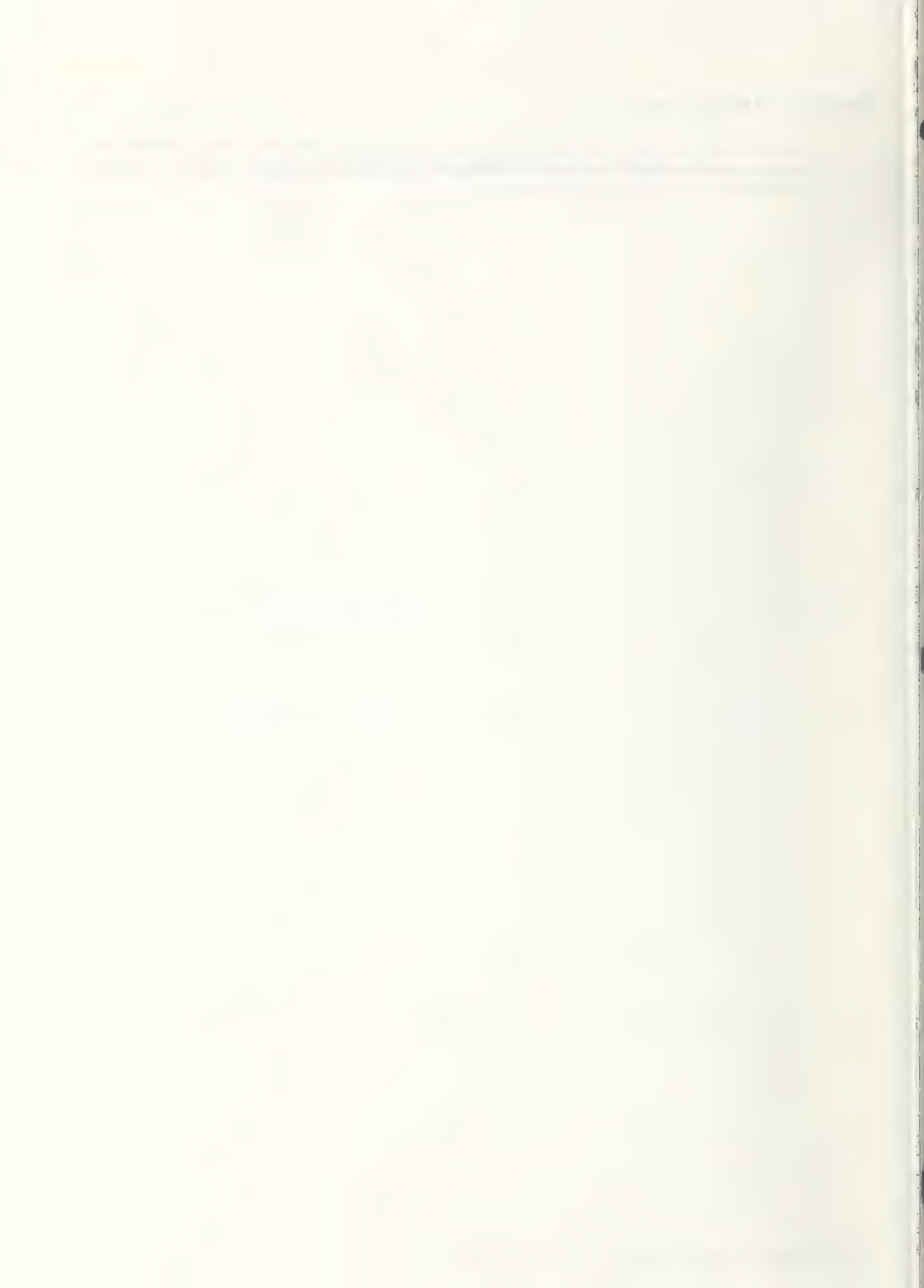
Future changes and additions to this version of these Implementor Agreements will be published as a new part. Deleted and replaced text will be shown as struck. New and replacement text will be shown as shaded.

Table of Contents

Part 25 - Health Care 1

Part 25 - Health Care

Editor's Note - This part is reserved for future stable Health Care agreements. These agreements may be found in the aligned part of the Working Implementation Agreements document. When these agreements become stable, they will be moved into Part 25.



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This document records current Stable Agreements for Open Systems Interconnection Protocols among the organizations participating in the OSI Implementors' Workshop Series.

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**SUPPLEMENT TO STABLE IMPLEMENTATION AGREEMENTS
FOR OPEN SYSTEMS INTERCONNECTION PROTOCOLS
NIST SPECIAL PUBLICATION 500-202**

This document records, in replacement page format, all changes to stable material which was current (according to Version and Edition number) as of the end of December 1991. In this case, that would be NIST SP 500-202, Version 5, Edition 1. By following the instructions below, and replacing or inserting the indicated pages, text will be created which reflects the current status of relevant stable material as of March 13, 1992.

If there are ~~redline~~ or ~~strikeout~~ in the Table of Contents, then that document should contain the replacement pages for March 1992. **THIS INSERT SET SHOULD BE SAVED.**

The following table gives all necessary information. Entries in the first column indicate that those pages are to be replaced with the pages referenced in the second column.

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| DELETE PAGE
NUMBER | INSERT PAGE
NUMBER | TECHNICAL | ALIGNMENT | EDITORIAL | OTHER |
|-----------------------|-----------------------|-----------|-----------|-----------|-------|
| Part 1
Cover | Part 1
Cover | | | x | |
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Foreword | Part 1
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| Part 2
Cover | Part 2
Cover | | | x | |
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Foreword | Part 2
Foreword | | | x | |
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Cover | Part 3
Cover | | | x | |
| Part 3
Foreword | Part 3
Foreword | | | x | |
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Foreword | | | x | |
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Cover | | | x | |
| Part 5
Foreword | Part 5
Foreword | | | x | |
| Part 6
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Cover | | | x | |
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Cover | | | x | |
| Part 8
Foreword | Part 8
Foreword | | | x | |

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Foreword | Part 10
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| Part 11
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Table of
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| | Part 11
insert Pages
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Cover | Part 12
Cover | | | x | |
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Foreword | Part 12
Foreword | | | x | |
| Part 13
Cover | Part 13
Cover | | | x | |
| Part 13
Foreword | Part 13
Foreword | | | x | |
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Cover | Part 14
Cover | | | x | |
| Part 14
Foreword | Part 14
Foreword | | | x | |
| Part 14
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| Part 14
Pages 79-80 | Part 14
Pages 79-80 | x | | | |
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Cover | Part 15
Cover | | | x | |

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Foreword | | | x | |
| Part 16
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Cover | | | x | |
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Foreword | Part 16
Foreword | | | x | |
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Cover | | | x | |
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Foreword | Part 17
Foreword | | | x | |
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Cover | Part 18
Cover | | | x | |
| Part 18
Foreword | Part 18
Foreword | | | x | |
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| Part 19
Foreword | Part 19
Foreword | | | x | |
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Cover | Part 20
Cover | | | x | |
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Foreword | Part 20
Foreword | | | x | |
| Part 21
Cover | Part 21
Cover | | | x | |
| Part 21
Foreword | Part 21
Foreword | | | x | |

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Cover | Part 22
Cover | | | x | |
| Part 22
Foreword | Part 22
Foreword | | | x | |
| Part 23
Cover | Part 23
Cover | | | x | |
| Part 23
Foreword | Part 23
Foreword | | | x | |
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Cover | Part 24
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| Part 24
Foreword | Part 24
Foreword | | | x | |
| Part 25
Cover | Part 25
Cover | | | x | |
| Part 25
Foreword | Part 25
Foreword | | | x | |

CHANGE PAGES TO VERSION 5, EDITION 1
OUTPUT FROM THE JUNE 1992 WORKSHOP
ISSUED SEPTEMBER 21, 1992

SUPPLEMENT TO STABLE IMPLEMENTATION AGREEMENTS
FOR OPEN SYSTEMS INTERCONNECTION PROTOCOLS
NIST SPECIAL PUBLICATION 500-202

This document records, in replacement page format, all changes to stable material which was current (according to Version and Edition number) as of the end of March 1992. In this case, that would be NIST SP 500-202, Version 5, Edition 1. By following the instructions below, and replacing or inserting the indicated pages, text will be created which reflects the current status of relevant stable material as of June 11, 1992.

If there are ~~redline~~ or ~~strikeout~~ in the Table of Contents, then that document should contain the replacement pages for June 1992. **THIS INSERT SET SHOULD BE SAVED.**

The following table gives all necessary information. Entries in the first column indicate that those pages are to be replaced with the pages referenced in the second column.

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| DELETE PAGE NUMBER | INSERT PAGE NUMBER | TECHNICAL | ALIGNMENT | EDITORIAL | OTHER |
|----------------------------------|---|-----------|-----------|-----------|-------|
| Part 1
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Cover | | | x | |
| Part 1
Foreword | Part 1
Foreword | | | x | |
| Part 1
Pages 1-2 | Part 1
Pages 1-2 | | | x | |
| Part 1
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| Part 2
Cover | Part 2
Cover | | | x | |
| Part 2
Foreword | Part 2
Foreword | | | x | |
| Part 2
TOC | Part 2
TOC | | | x | |
| Part 2
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Pages 1-2 | | | x | |
| Part 2
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Pages 3-4 | | | x | |
| | Part 2
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18(blank) | Part 2
Pages 17-18 | | | | x |
| | Part 2 insert
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| | Part 2 insert
Pages 21-22 | | | x | |
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Cover | Part 3
Cover | | | x | |
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Foreword | Part 3
Foreword | | | x | |

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TOC | | | x | |
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| Part 4
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Foreword | | | x | |
| Part 4
TOC | Part 4
TOC | | | x | |
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14(blank) | | | x | |
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Cover | | | x | |
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Foreword | Part 6
Foreword | | | x | |
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Foreword | | | x | |
| Part 8
Cover | Part 8
Cover | | | x | |
| Part 8
Foreword | Part 8
Foreword | | | x | |
| Part 9
Cover | Part 9
Cover | | | x | |
| Part 9
Foreword | Part 9
Foreword | | | x | |

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Cover | Part 10
Cover | | | x | |
| Part 10
Foreword | Part 10
Foreword | | | x | |
| Part 10
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Cover | | | x | |
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Foreword | Part 11
Foreword | | | x | |
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Cover | | | x | |
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Foreword | Part 12
Foreword | | | x | |
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Cover | Part 13
Cover | | | x | |
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Cover | Part 14
Cover | | | x | |
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Foreword | Part 14
Foreword | | | x | |
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Cover | Part 15
Cover | | | x | |
| Part 15
Foreword | Part 15
Foreword | | | x | |

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TOC | | | x | |
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Cover | Part 16
Cover | | | x | |
| Part 16
Foreword | Part 16
Foreword | | | x | |
| Part 17
Cover | Part 17
Cover | | | x | |
| Part 17
Foreword | Part 17
Foreword | | | x | |
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Cover | Part 18
Cover | | | x | |
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(blank) | | | | x |
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| Part 20
Cover | Part 20
Cover | | | x | |
| Part 20
Foreword | Part 20
Foreword | | | x | |
| Part 21
Cover | Part 21
Cover | | | x | |
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Foreword | Part 21
Foreword | | | x | |
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Cover | Part 22
Cover | | | x | |

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Foreword | | | x | |
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Cover | Part 25
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Foreword | Part 25
Foreword | | | x | |

**CHANGE PAGES TO VERSION 5, EDITION 1
OUTPUT FROM THE SEPTEMBER 1992 WORKSHOP
ISSUED DECEMBER 14, 1992**

**SUPPLEMENT TO STABLE IMPLEMENTATION AGREEMENTS
FOR OPEN SYSTEMS INTERCONNECTION PROTOCOLS
NIST SPECIAL PUBLICATION 500-202**

This document records, in replacement page format, all changes to stable material which was current (according to Version and Edition number) as of the end of June 1992. In this case, that would be NIST SP 500-202, Version 5, Edition 1. By following the instructions below, and replacing or inserting the indicated pages, text will be created which reflects the current status of relevant stable material as of September 25, 1992.

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| DELETE PAGE
NUMBER | INSERT PAGE
NUMBER | TECHNICAL | ALIGNMENT | EDITORIAL | OTHER |
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| Part 1
Cover | Part 1
Cover | | | x | |
| Part 1
Foreword | Part 1
Foreword | | | x | |
| Part 2
Cover | Part 2
Cover | | | x | |
| Part 2
Foreword | Part 2
Foreword | | | x | |
| Part 3
Complete Part | Part 3
Complete Part | | | x | |
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| Part 4
Foreword | Part 4
Foreword | | | x | |
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Cover | Part 5
Cover | | | x | |
| Part 5
Foreword | Part 5
Foreword | | | x | |
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Cover | Part 7
Cover | | | x | |
| Part 7
Foreword | Part 7
Foreword | | | x | |
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insert
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Foreword | Part 9
Foreword | | | x | |
| Part 10
Cover | Part 10
Cover | | | x | |
| Part 10
Foreword | Part 10
Foreword | | | x | |
| Part 11
Cover | Part 11
Cover | | | x | |
| Part 11
Foreword | Part 11
Foreword | | | x | |
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Cover | | | x | |
| Part 12
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| Part 13
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Cover | | | x | |
| Part 13
Foreword | Part 13
Foreword | | | x | |
| Part 14
Cover | Part 14
Cover | | | x | |
| Part 14
Foreword | Part 14
Foreword | | | x | |

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Complete Part | | | x | |
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Complete Part | Part 18
Complete Part | | | | x |
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Foreword | | | x | |
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| Part 20
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Foreword | | | x | |
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| Part 25
Cover | Part 25
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| Part 25
Foreword | Part 25
Foreword | | | x | |

NIST *Technical Publications*

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